F 5

```
BBBBBBBBBBBB        OOOOOOOOO          OOOOOOOOO     TTTTTTTTTTTTTTT     SSSSSSSSSSSS
BBBBBBBBBBBB        OOOOOOOOO          OOOOOOOOO     TTTTTTTTTTTTTTT     SSSSSSSSSSSS
BBBBBBBBBBBB        OOOOOOOOO          OOOOOOOOO     TTTTTTTTTTTTTTT     SSSSSSSSSSSS
BBB         BBB  OOO         OOO  OOO         OOO          TTT         SSS
BBB         BBB  OOO         OOO  OOO         OOO          TTT         SSS
BBB         BBB  OOO         OOO  OOO         OOO          TTT         SSS
BBB         BBB  OOO         OOO  OOO         OOO          TTT         SSS
BBB         BBB  OOO         OOO  OOO         OOO          TTT         SSS
BBB         BBB  OOO         OOO  OOO         OOO          TTT         SSS
BBBBBBBBBBBB     OOO         OOO  OOO         OOO          TTT            SSSSSSSSS
BBBBBBBBBBBB     OOO         OOO  OOO         OOO          TTT            SSSSSSSSS
BBBBBBBBBBBB     OOO         OOO  OOO         OOO          TTT            SSSSSSSSS
BBB         BBB  OOO         OOO  OOO         OOO          TTT                     SSS
BBB         BBB  OOO         OOO  OOO         OOO          TTT                     SSS
BBB         BBB  OOO         OOO  OOO         OOO          TTT                     SSS
BBB         BBB  OOO         OOO  OOO         OOO          TTT                     SSS
BBB         BBB  OOO         OOO  OOO         OOO          TTT                     SSS
BBB         BBB  OOO         OOO  OOO         OOO          TTT                     SSS
BBBBBBBBBBBB        OOOOOOOOO          OOOOOOOOO           TTT         SSSSSSSSSSSS
BBBBBBBBBBBB        OOOOOOOOO          OOOOOOOOO           TTT         SSSSSSSSSSSS
BBBBBBBBBBBB        OOOOOOOOO          OOOOOOOOO           TTT         SSSSSSSSSSSS
```

```
**FILE**ID**BOOT58

BBBBBBBB      000000      000000    TTTTTTTTTT  5555555555    888888
BBBBBBBB      000000      000000    TTTTTTTTTT  5555555555    888888
BB      BB  00      00  00      00      TT      55          88      88
BB      BB  00      00  00      00      TT      55          88      88
BB      BB  00      00  00      00      TT      555555      88      88
BB      BB  00      00  00      00      TT      555555      88      88
BBBBBBBB    00      00  00      00      TT            55      888888
BBBBBBBB    00      00  00      00      TT            55      888888
BB      BB  00      00  00      00      TT              55  88      88
BB      BB  00      00  00      00      TT              55  88      88
BB      BB  00      00  00      00      TT      55      55  88      88      ....
BB      BB  00      00  00      00      TT      55      55  88      88      ....
BBBBBBBB      000000      000000        TT        555555      888888        ....
BBBBBBBB      000000      000000        TT        555555      888888        ....


LL            IIIIII      SSSSSSSS
LL            IIIIII      SSSSSSSS
LL              II      SS
LL              II      SS
LL              II      SS
LL              II      SS
LL              II        SSSSSS
LL              II        SSSSSS
LL              II              SS
LL              II              SS
LL              II              SS
LL              II              SS
LLLLLLLLLL    IIIIII    SSSSSSSS
LLLLLLLLLL    IIIIII    SSSSSSSS
```

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```

```
0000            .TITLE  BOOT58 - Bootstrap command processor
0000            .IDENT  'V04-000'
0000
0000    ;
0000    ;****************************************************************************
0000    ;*                                                                          *
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0000    ;*                                                                          *
0000    ;*                                                                          *
0000    ;****************************************************************************
0000    ;
0000    ;++
0000    ;
0000    ; FACILITY:
0000    ;
0000    ;       Bootstrap command processing module
0000    ;
0000    ; ENVIRONMENT:
0000    ;
0000    ;       Runs at IPL 31, kernel mode, memory management is OFF, IS=1
0000    ;       (running on interrupt stack), and code must be PIC.
0000    ;
0000    ; ABSTRACT:
0000    ;
0000    ;       This module gains control from the boot block 0 code. The module
0000    ;       processes commands entered interactively from the console
0000    ;       terminal, or commands contained in command procedure files on
0000    ;       the boot device.
0000    ;
0000    ; AUTHOR:
0000    ;
0000    ;       Carol Peters    22 March 1979
0000    ;
0000    ; MODIFIED BY:
0000    ;
0000    ;       V03-003 ACG0392         Andrew C. Goldstein,    19-Jan-1984  22:39
0000    ;               Tie off SYS$FILESCAN for TPARSE use
0000    ;
0000    ;       V03-002 KTA3085         Kerbey T. Altmann       03-Oct-1985
0000    ;               Add some more dummy symbols for XDELTA.  Add ability
0000    ;               to boot unattended.
```

```
0000  ;
0000  ;       V03-001 ACG0345         Andrew C. Goldstein,     1-Aug-1983  16:45
0000  ;               Add dummy SYS$ASCTOID routine for TPARSE
0000  ;
0000  ;       Steve Jeffreys  04-DEC-1979
0000  ;               - Added documentation for indirect command file processing.
0000  ;               - Echo command line for indirect command files.
0000  ;               - Added HELP command.
0000  ;               - Added BOOT command.
0000  ;               - Fixed D/I command.
0000  ;               - Added /B size qualifier.
0000  ;               - Make START command invalidate the Translation Buffer
0000  ;                 before JMPing to the new image.
0000  ;--
```

```
                    0000     73             .SBTTL  Declarations
                    0000     74
                    0000     75     ;
                    0000     76     ; Macros
                    0000     77     ;
                    0000     78
                    0000     79             $DSCDEF                                 ; String descriptor definitions
                    0000     80             $PRDEF                                  ; Processor registers
                    0000     81             $RPBDEF                                 ; RPB definitions
                    0000     82             $SSDEF                                  ; Status code definitions
                    0000     83             $TPADEF                                 ; TPARSE field definitions
                    0000     84
                    0000     85     ;
                    0000     86     ; Macro to print messages to terminal.
                    0000     87     ;
                    0000     88
                    0000     89             .MACRO  MSG,STR
                    0000     90             BSBW    BOO$FACMSG
                    0000     91             .ASCIZ  \'STR'\
                    0000     92             .ENDM   MSG
                    0000     93
                    0000     94     ;
                    0000     95     ; Equated symbols:
                    0000     96     ;
                    0000     97
          0000000D  0000     98             CAR_RETURN      = 13                    ; ASCII carriage return code.
          0000000C  0000     99             FORM_FEED       = 12                    ; ASCII form feed code.
          0000000B  0000    100             VERTICAL_TAB    = 11                    ; ASCII vertical tab.
          0000000A  0000    101             LINE_FEED       = 10                    ; ASCII linefeed code.
          00000000  0000    102             NULL            = 0                     ; ASCII null character code.
                    0000    103
          00000001  0000    104             SADEBUG         = 1                     ; Include XDELTA in image.
          00000001  0000    105             SAENVIRON       = 1                     ; Operating standalone.
          00000000  0000    106             TSDEBUG         = 0                     ; Include DEBUG in image.
                    0000    107
                    0000    108             _VIELD  CMD,0,<-                        ; Command details bit defs.
                    0000    109                     <LOADCMD,,M>,-                  ; Load command.
                    0000    110                     <STARTCMD,,M>,-                 ; Start command.
                    0000    111                     <EXAMCMD,,M>,-                  ; Examine command.
                    0000    112                     <DEPOSCMD,,M>,-                 ; Deposit command.
                    0000    113                     <HELPCMD,,M>,-                  ; Help command.
                    0000    114                     <BOOTCMD,,M>,-                  ; Boot command.
                    0000    115                     <CMDFILCMD,,M>,-                ; Indirect command file.
                    0000    116                     <INDIRECT,,M>,-                 ; Processing indirect file.
                    0000    117                     <PHYSICAL,,M>,-                 ; Physical address.
                    0000    118                     <GENERAL,,M>,-                  ; General register.
                    0000    119                     <INTERNAL,,M>,-                 ; Internal processor register.
                    0000    120                     <LONG,,M>,-                     ; Longword length field.
                    0000    121                     <WORD,,M>,-                     ; Word length field.
                    0000    122                     <BYTE,,M>,-                     ; Byte length field.
                    0000    123                     <NULLDEV,,M>,-                  ; Null boot device
                    0000    124                     <UNATTEND,,M>,-                 ; Unattended DEFBOO
                    0000    125                     >
                    0000    126
          0000000B  0000    127             RPB$V_NODEFBOO  = RPB$V_MPM             ; Reuse this bit as no MA750 exists.
          00000800  0000    128             RPB$M_NODEFBOO  = RPB$M_MPM
                    0000    129
```

```
00000007  0000          NUM_OF_CMDS     = 7                     ; # of commands
0000003F  0000          MAX_PROC_REG    = ^X3F                  ; Highest processor register.
          0000
00000000  0000          SAVED_R0        = 0                     ; Offset to registers saved on
00000001  0000          SAVED_R1        = 1                     ; stack.
00000002  0000          SAVED_R2        = 2
00000003  0000          SAVED_R3        = 3
00000004  0000          SAVED_R4        = 4
00000005  0000          SAVED_R5        = 5
00000006  0000          SAVED_R6        = 6
00000007  0000          SAVED_R7        = 7
00000008  0000          SAVED_R8        = 8
00000009  0000          SAVED_R9        = 9
0000000A  0000          SAVED_R10       = 10
0000000B  0000          SAVED_R11       = 11
0000000C  0000          SAVED_AP        = 12
0000000D  0000          SAVED_FP        = 13
0000000E  0000          SAVED_SP        = 14
0000000F  0000          SAVED_PC        = 15
          0000
          0000    ;
          0000    ; BOOT58 resides in the upper quarter of the 64K bytes of good memory
          0000    ; available during bootstrap operations. The BOOT58 location allows
          0000    ; VMB to be loaded at <base of memory + ^X200> as usual, and also
          0000    ; permits the diagnostic supervisor to be loaded at
          0000    ; <base of memory + ^XE000>. If BOOT58 grows in size, it may be
          0000    ; necessary to lower its address.
          0000    ;
          0000
0000C000  0000          BOOT58_OFFSET   = ^XC000                ; Offset to BOOT58 from start
          0000                                                  ; of good memory.
          0000
          0000    ;
          0000    ; Own storage.
          0000    ;
          0000
      00000000          .PSECT  BOOT58_DATA,LONG                ; Data PSECT.
          0000
          0000    PARAM_BLOCK:                                  ; Parser parameter block.
00000024  0000          .BLKB   TPA$K_LENGTH0
          0024
          0024    GOODMEM_BASE:                                 ; Base address of good memory.
00000000  0024          .LONG   0
          0028
          0028    FIRST_FREE_BYTE:                              ; Address of first free byte
00000000  0028          .LONG   0                               ; past BOOT58.
          002C
          002C    COMMAND_FLAGS:                                ; Mask describing details of
00000000  002C          .LONG   0                               ; current and previous commands.
          0030
          0030    CURRENT_ADDRESS:                              ; Address field of this EXAMINE
00000000  0030          .LONG   0                               ; or DEPOSIT command.
          0034
          0034    LAST_ADDRESS:                                 ; Address field of last EXAMINE
00000000  0034          .LONG   0                               ; or DEPOSIT command.
          0038
          0038    LAST_VALUE:                                   ; Last value displayed.
```

```
                   00000000  0038   187             .LONG   0
                             003C   188
                             003C   189 SAVED_VALUE:                           ; Holds a value.
                   00000000  003C   190             .LONG   0
                             0040   191
                             0040   192 REGISTER_TABLE:                        ; Address of register values.
                   00000000  0040   193             .LONG   0
                             0044   194
                             0044   195 HOLD_DEPOSIT:                          ; Value to be deposited in
                   00000000  0044   196             .LONG   0                  ; DEPOSIT command.
                             0048   197
                             0048   198 START_ADDRESS:                         ; Address given in START or
                   00000000  0048   199             .LONG   0                  ; LOAD command.
                             004C   200
                             004C   201 FILE_DESCRIP:                          ; Descriptor of file spec.
          00000000 00000000  004C   202             .LONG   0,0
                             0054   203
                             0054   204 HELP_FILE_SPEC:                        ; Help file name string.
50 4C 48 2E 4C 4F 53 4E 4F 43  0054   205             .ASCII  /CONSOL.HLP/
                             005E   206
                             005E   207 HELP_FILE_DESCRIP:                     ; File descripter for HELP file.
                   0000000A  005E   208             .LONG   10                 ;       File spec length
                   00000000  0062   209             .LONG   0                  ;       File spec address
                             0066   210
                             0066   211 DEFBOO_SPEC:                           ; Default boot command file spec
44 4D 43 2E 4F 4F 42 46 45 44  0066   212             .ASCII /DEFBOO.CMD/     ;
                             0070   213
                             0070   214 DEFBOO_DESCRIP:                        ; Default boot command file descripter
                   0000000A  0070   215             .LONG   10                 ;       File spec length
                   00000000  0074   216             .LONG   0                  ;       File spec address
                             0078   217
                             0078   218 BOOTFILE_SPEC:                         ; Boot command file spec
44 4D 43 2E 4F 4F 42 58 58 58  0078   219             .ASCII /XXXBOO.CMD/     ;
                             0082   220
                             0082   221 BOOTFILE_DESCRIP:                      ; Boot command file descripter
                   0000000A  0082   222             .LONG   10                 ;       File spec length
                   00000000  0086   223             .LONG   0                  ;       File spec address
                             008A   224
                             008A   225 DEV_SPEC:                              ; Device spec
                   0000008F  008A   226             .BLKB   5                  ;       Allow only 5 characters
                             008F   227
                             008F   228 DEV_DESCRIP:                           ; Device descripter
                   00000000  008F   229             .LONG   0                  ;       Device spec length
                   00000000  0093   230             .LONG   0                  ;       Device spec address
                             0097   231
                             0097   232 UNIT_NUMBER:                           ; Boot device unit number
                   00000000  0097   233             .LONG   0                  ;       Values 0..9
                             009B   234
                             009B   235 FILE_SPEC:                             ; Address of file specification.
                   000000DB  009B   236             .BLKB   64
                             00DB   237
                             00DB   238 COMMAND_BUFFER:                        ; Command buffer.
            54 4F 4F 42 00'  00DB   239             .ASCIC  /BOOT/             ; Unattended DEFBOO
                         04  00DB
                   000001A3  00E0   240             .BLKB   200-5
                             01A3   241
                   000000C4  01A3   242 CMD_BUFFER_SIZE = .-COMMAND_BUFFER-4   ; Length of command buffer.
```

```
                                01A3   243                                          ; (Allow 4 bytes for LINE_TERM)
                                01A3   244
                                01A3   245 COMMAND_STRING:                          ; Command string buffer.
                                01A3   246 DIREC_BUFFER:                            ; RT-11 directory buffer.
                      000005A3  01A3   247         .BLKB   1024
                                05A3   248
                      00000400  05A3   249 CMD_STRING_SIZE = .-COMMAND_STRING       ; Length of command string.
                                05A3   250
                                05A3   251 IND_CMDBUFFER:                           ; Indirect command file buffer.
                      000007A3  05A3   252         .BLKB   512
                                07A3   253
                                07A3   254 IND_CMDBUF_PTR:                          ; Pointer to next byte to read
                      00000000  07A3   255         .LONG   0                        ; in indirect command buffer.
                                07A7   256
                                07A7   257 IND_W_BLKS_LEFT:                         ; number of blocks left to read
                          0000  07A7   258         .WORD   0                        ; in command file
                                07A9   259
                                07A9   260 IND_W_NEXT_LBN:                          ; Next LBN to read from indirect
                          0000  07A9   261         .WORD   0                        ; command file.
                                07AB   262
                                07AB   263 SAVED_STATUS:                            ; Temp storage of exit status
                      000007AD  07AB   264         .BLKW   1
                                07AD   265
                                07AD   266 IN_COMMAND_FILE:                         ; Used as boolean
                      000007AE  07AD   267         .BLKB   1
                                07AE   268
                                07AE   269 PROMPT_STRING:                           ; BOOT58's prompt string.
   00 3E 38 35 54 4F 4F 42 0A 0D  07AE   270         .ASCIZ  <CAR_RETURN><LINE_FEED>/BOOT58>/
                                07B8   271
                                07B8   272 LINE_TERM:                               ; Line terminator for lines to be echoed.
                   00 00 0A 0D  07B8   273         .ASCIZ  <CAR_RETURN><LINE_FEED><NULL>
                                07BC   274
                                07BC   275 OUTPUT_BUFFER:                           ; FAO output buffer.
                      000007E4  07BC   276         .BLKB   40
                                07E4   277
                      00000028  07E4   278 OUTBUF_LENGTH   = .-OUTPUT_BUFFER        ; Length of FAO output buffer.
                                07E4   279
                                07E4   280 W_FAO_OUT_LEN:                           ; Location to hold length of
                          0000  07E4   281         .WORD   0                        ; FAO output string.
                                07E6   282
                                07E6   283 LONG_PHY_FORMAT:                         ; FAO control string.
 20 4C 58 38 21 20 20 50 5F 21 2F 21  07E6   284         .ASCII  %!/!_P  !8XL  !8XL%      ; Display a hex longword.
                4C 58 38 21 20  07F2
                                07F7   285
                      00000011  07F7   286 FORMAT_LENGTH   = .-LONG_PHY_FORMAT      ; Length of FAO format string.
                                07F7   287
                                07F7   288 OUTPUT_FORMAT:                           ; String in which to store a
                      00000808  07F7   289         .BLKB   FORMAT_LENGTH            ; dynamic output format.
                                0808   290
                                0808   291 B_ERROR_OUT:                             ; Error message already output
                            00  0808   292         .BYTE   0                        ; for this command.
                                0809   293
                                0809   294 B_ENVIRON_SAFE:                          ; Flag saying that an exception
                            00  0809   295         .BYTE   0                        ; occurred during parse.
                                080A   296
                                080A   297 L_OLD_STACKP:                            ; Location to save stack
                      00000000  080A   298         .LONG   0                        ; pointer in case of exceptions.
                080E   299
                080E   300 DRIVER_SUBROUT::                            ; Holds address of device ROM
       00000000 080E   301         .LONG   0                           ; driver subroutine.
                0812   302
                0812   303 ;
                0812   304 ; Declarations for the aid of XDELTA.
                0812   305 ;
                0812   306
            00000000   307         .PSECT  __Z99BOOT,Page              ; PSECT that always links at end
                0000   308                                             ; of this program.
                0000   309
                0000   310 BOOTHIGH:                                   ; Symbol to mark the start of
                0000   311                                             ; the first page after the code
                0000   312                                             ; in this module.
                0000   313
       00000001 0000   314         .IF     NE,SADEBUG                  ; If XDELTA is included,
       00000004 0000   315 EXE$MCHKVEC     == BOOTHIGH+4               ; define a symbol used by XDELTA
                0000   316         .ENDC                               ; to locate the SCB.
```

```
0000            .SBTTL  Parse tables
0000    ;
0000    ; The following documenation is taken from the help file that is printed
0000    ; by BOOT58 via the HELP command.
0000    ;
0000
0000    ;++
0000    ; GENERAL:
0000    ;
0000    ; <location>      ::= <value> ! <register>
0000    ;
0000    ; <value>         ::= <number> ! <shorthand>
0000    ;
0000    ; <number>        ::= Any nonnegative HEXADECIMAL number.
0000    ;
0000    ; <register>      ::= 0..F
0000    ;
0000    ; <shorthand>     ::= Any one of the following:
0000    ;                         ''*'' - use LAST <location> specified
0000    ;                         ''+'' - use (LAST <location>) + 1
0000    ;                         ''-'' - use (LAST <location>) - 1
0000    ;                         ''@'' - use contents of (LAST <location>)
0000    ;
0000    ; <loc_qual>      ::= Any one of the following:
0000    ;                         ''/P'' - physical memory address
0000    ;                         ''/G'' - general register
0000    ;                         ''/I'' - internal processor register
0000    ;
0000    ; <size_qual>     ::= Any one of the following:
0000    ;                         ''/L'' - size = longword
0000    ;                         ''/W'' - size = word
0000    ;                         ''/B'' - size = byte
0000    ;
0000    ; <devspec>       ::= A device spec of the form: DDCU, where
0000    ;                         DD = Generic device type (eg. DB)
0000    ;                         C  = controller designator (A ! B)
0000    ;                         U  = unit number (0..9)
0000    ;
0000    ; <filespec>      ::= A legal RT-11 filename of the form: NAME.TYP, where
0000    ;                         NAME = any alphanumeric string of not more than 6 chars.
0000    ;                         TYP  = any alphanumeric string of not more than 3 chars.
0000    ;                                a null TYP is acceptable.
0000    ;
0000    ; BOOT58 COMMANDS:
0000    ;
0000    ; BOOT [<devspec>]
0000    ;
0000    ;       Boot from the device specified.  If no device is specified, boot from
0000    ;       the default boot device.  This command cannot be used within an indirect
0000    ;       command  file.
0000    ;
0000    ;
0000    ; DEPOSIT [<loc_qual><size_qual>] <location> <value>
0000    ;
0000    ;       Deposit <value> at the location specifed by <location>.
0000    ;       The <location> is interpreted according to the qualifiers.
0000    ;
```

```
0000      ;
0000      ; EXAMINE [<loc_qual><size_qual>] <location>
0000      ;
0000      ;       Display the contents of <location>, where <location> is interpreted
0000      ;       according to the qualifiers.
0000      ;
0000      ;
0000      ; HELP
0000      ;
0000      ;       Print this text at the console.  This command cannot be used within
0000      ;       an indirect command file.
0000      ;
0000      ; LOAD <filespec>[/START:<value>]
0000      ;
0000      ;       Load a file from the boot device into memory starting at the address
0000      ;       specified <number>.  If no starting location is specified, load the
0000      ;       file beginning at the first free location in memory.
0000      ;
0000      ;
0000      ; START <value>
0000      ;
0000      ;       JMP to <value>.
0000      ;
0000      ;
0000      ; NOTE:
0000      ;
0000      ;       All BOOT58 commands may be abbreviated to the least amount of
0000      ;       significant characters.  Since the first character of each command
0000      ;       is unique, this means all commands may be abbreviated to the one
0000      ;       character.  For example, the BOOT command may be entered as "B".
0000      ;
0000      ;       Some processor registers are either read or write only.  Attempting
0000      ;       the wrong operation (ie. E/I <write_only_reg>) on such a register
0000      ;       will yield unpredictable results.
0000      ;--
0000
0000
0000              $INIT_STATE -                   ; Start of TPARSE state table.
0000                      BOOT58_TABLE,KEY_TABLE  ; Name of state and keyword
0000                                              ; table.
0000
0000      ;
0000      ; Define a command line.
0000      ;
0000
0000              $STATE
0000              $TRAN   !VALID_COMMAND,-        ; Accept valid command.
0000                      TPA$_EXIT,-
0000                      EXECUTE_COMMAND
0000              $TRAN   TPA$_EOS,TPA$_EXIT      ; Accept null command.
0000
0000      ;
0000      ; Parse a valid command, which is a syntactically-correct command
0000      ; followed immediately by end of line.
0000      ;
0000
0000              $STATE  VALID_COMMAND           ; Accept valid command.
```

```
0000            $TRAN   !LOADCMD,,SET_LOAD_FLAG ; Set flag for load command.
0000            $TRAN   !STARTCMD,,-            ; Set flag for start command.
0000                    SET_START_FLAG
0000            $TRAN   !EXAMINECMD,,-          ; Set flag for examine command.
0000                    SET_EXAM_FLAG
0000            $TRAN   !DEPOSITCMD,,-          ; Set flag for deposit command.
0000                    SET_DEPOS_FLAG
0000            $TRAN   !HELPCMD,,SET_HELP_FLAG ; Set flag for help command.
0000            $TRAN   !BOOTCMD,,SET_BOOT_FLAG ; Set flag for boot command.
0000            $TRAN   !CMDFILE,,-             ; Set flag for indirect command
0000                    SET_CMDFIL_FLAG         ; file.
0000            $STATE
0000            $TRAN   TPA$_EOS,TPA$_EXIT      ; End command with end of line.
0000
0000    ;
0000    ; Load command.
0000    ;
0000
0000            $STATE  LOADCMD                 ; Command that loads a file
0000                                            ; into memory.
0000            $TRAN   'LOAD'                  ; Command verb.
0000            $STATE
0000            $TRAN   !FILESPEC,,MOV_FILESPEC ; Parse file specification.
0000            $STATE
0000            $TRAN   !LOAD_QUAL,TPA$_EXIT    ; Optional start address.
0000            $TRAN   TPA$_LAMBDA,TPA$_EXIT   ; Null start address.
0000
0000    ;
0000    ; Start command.
0000    ;
0000
0000            $STATE  STARTCMD                ; Command that starts executing
0000                                            ; code at a given address.
0000            $TRAN   'START'                 ; Command verb.
0000            $STATE
0000            $TRAN   !EXPLICIT_VALUE,-       ; Starting address.
0000                    TPA$_EXIT,SET_STARTADDR
0000
0000    ;
0000    ; Examine command.
0000    ;
0000
0000            $STATE  EXAMINECMD              ; Command that displays the
0000                                            ; contents of some location.
0000            $TRAN   'EXAMINE'               ; Command verb.
0000            $STATE
0000            $TRAN   !EXADEP_QUAL            ; Parse qualifiers
0000            $STATE
0000            $TRAN   !ANY_VALUE,TPA$_EXIT,-  ; Examine special location.
0000                    EXADEP_ADDR
0000
0000    ;
0000    ; Deposit command.
0000    ;
0000
0000            $STATE  DEPOSITCMD              ; Command to deposit data in
0000                                            ; a word or longword location.
```

```
0000            $TRAN   'DEPOSIT'                   ; Command verb.
0000            $STATE
0000            $TRAN   !EXADEP_QUAL                ; Parse qualifiers
0000            $STATE
0000            $TRAN   !EXPLICIT_VALUE,,-          ; Specify special location
0000                    EXADEP_ADDR
0000            $STATE
0000            $TRAN   !EXPLICIT_VALUE,-           ; Specify data to be deposited.
0000                    TPA$_EXIT,DEPOSIT_VALUE
0000
0000    ;
0000    ; Examine and deposit qualifiers.
0000    ;
0000
0000            $STATE  EXADEP_QUAL                 ; Qualifiers.
0000            $TRAN   !LOC_QUAL                   ; Location qualifiers
0000            $TRAN   TPA$_LAMBDA                 ; Allow null location qualifier
0000            $STATE
0000            $TRAN   !SIZE_QUAL,TPA$_EXIT        ; Size qualifiers
0000
0000    ;
0000    ; Location qualifers.
0000    ;
0000            $STATE  LOC_QUAL
0000            $TRAN   '/'
0000            $TRAN   TPA$_LAMBDA,TPA$_EXIT
0000            $STATE
0000            $TRAN   'G',TPA$_EXIT,SET_GENERAL
0000            $TRAN   'I',TPA$_EXIT,SET_INTERNAL
0000            $TRAN   'P',TPA$_EXIT,SET_PHYSICAL
0000
0000    ;
0000    ; Size qualifiers
0000    ;
0000            $STATE  SIZE_QUAL
0000            $TRAN   '/'
0000            $TRAN   TPA$_LAMBDA,TPA$_EXIT
0000            $STATE
0000            $TRAN   'L',TPA$_EXIT,SET_LONG
0000            $TRAN   'W',TPA$_EXIT,SET_WORD
0000            $TRAN   'B',TPA$_EXIT,SET_BYTE
0000    ;
0000    ; Numeric value.
0000    ;
0000
0000            $STATE  NUMBER                      ; Accept a hexadecimal value.
0000            $TRAN   TPA$_HEX,TPA$_EXIT
0000            $TRAN   '@',TPA$_EXIT,-             ; Accept an at sign meaning
0000                    USE_LAST_VALUE              ; last value displayed.
0000
0000    ;
0000    ; Special location for an examine command.
0000    ;
0000
0000            $STATE  ANY_VALUE                   ; Accept a special character
0000                                                ; indicating a location.
0000            $TRAN   !EXPLICIT_VALUE,-           ; Accept a deposit location.
```

```
0000                    TPA$_EXIT
0000            $TRAN   TPA$_LAMBDA,TPA$_EXIT,- ; Or accept a null examine
0000                    USE_NEXT_ADDR           ; location, meaning "next".
0000
0000    ;
0000    ; Special location for an examine or deposit command.
0000    ;
0000
0000            $STATE  EXPLICIT_VALUE          ; Accept "*", "+", or "P".
0000            $TRAN   !NUMBER,TPA$_EXIT       ; Accept any number.
0000            $TRAN   '*',TPA$_EXIT,-         ; Use location used in last
0000                    USE_LAST_ADDR           ; examine or deposit command.
0000            $TRAN   '+',TPA$_EXIT,-         ; Use next sequential location
0000                    USE_NEXT_ADDR           ; a word or longword from last
0000                                            ; location.
0000            $TRAN   '-',TPA$_EXIT,-         ; Use previous address
0000                    USE_PREVIOUS
0000
0000    ;
0000    ; Parse a file specification for the LOAD command and for indirect
0000    ; files.
0000    ;
0000
0000            $STATE  FILESPEC                ; Untangle a file specification.
0000            $TRAN   TPA$_STRING             ; Parse a file name.
0000            $STATE
0000            $TRAN   '.'                     ; Starts with a dot.
0000            $TRAN   TPA$_LAMBDA,TPA$_EXIT   ; Accept null file type.
0000            $STATE
0000            $TRAN   TPA$_STRING,TPA$_EXIT   ; Ends in a normal string.
0000            $TRAN   TPA$_LAMBDA,TPA$_EXIT   ; Can be null file type too.
0000
0000    ;
0000    ; Load qualifier.
0000    ;
0000
0000            $STATE  LOAD_QUAL               ; Process /START qualifier.
0000            $TRAN   '/'                     ; Starts with a slash.
0000            $STATE
0000            $TRAN   'START'                 ; Then the word 'START'.
0000            $STATE
0000            $TRAN   ':'                     ; Then a colon.
0000            $STATE
0000            $TRAN   !EXPLICIT_VALUE,-       ; Then a start address.
0000                    TPA$_EXIT,SET_STARTADDR
0000    ;
0000    ; Help command.
0000    ;
0000            $STATE  HELPCMD                 ; Print help text at console
0000            $TRAN   'HELP'                  ; Command verb
0000            $STATE
0000            $TRAN   TPA$_LAMBDA,TPA$_EXIT   ; No text expected after 'HELP'
0000
0000    ;
0000    ; Boot command.
0000    ;
0000            $STATE  BOOTCMD                 ; Boot from default boot file
```

```
    0000             $TRAN   'BOOT'                          ; Command verb
    0000             $STATE
    0000             $TRAN   !DEVSPEC,TPA$_EXIT,SAV_DEVSPEC  ; Parse device spec
    0000             $TRAN   TPA$_EOS,TPA$_EXIT,-            ; Accept null device spec
    0000                     ,CMD_M_NULLDEV,COMMAND_FLAGS
    0000
    0000     ;
    0000     ; Device spec.
    0000     ;
    0000             $STATE  DEVSPEC                         ; 3 character device spec
    0000             $TRAN   !DEVICE_TYPE                    ; Get the generic device type
    0000             $STATE
    0000             $TRAN   !CONTROLLER                     ; Get the controller designater
    0000             $STATE
    0000             $TRAN   TPA$_DECIMAL,,,,UNIT_NUMBER     ; Get unit number
    0000             $STATE
    0000             $TRAN   ':',TPA$_EXIT                   ; Parse optional colon
    0000             $TRAN   TPA$_LAMBDA,TPA$_EXIT
    0000
    0000
    0000     ;
    0000     ; Device types.
    0000     ;
    0000             $STATE  DEVICE_TYPE                     ; Parse the 2 char generic device type
    0000             $TRAN   TPA$_ALPHA                      ; Get first char
    0000             $STATE
    0000             $TRAN   TPA$_ALPHA,TPA$_EXIT            ; Get second char
    0000
    0000
    0000     ;
    0000     ; Parse the 1 char contoller designator.
    0000     ;
    0000             $STATE  CONTROLLER                      ; Parse a controller spec
    0000             $TRAN   'A',TPA$_EXIT
    0000             $TRAN   'B',TPA$_EXIT
    0000
    0000
    0000
    0000
    0000     ;
    0000     ; Indirect command files.
    0000     ;
    0000
    0000             $STATE  CMDFILE                         ; Locate and execute a command
    0000                                                     ; file.
    0000             $TRAN   '@'                             ; Starts with at sign.
    0000             $STATE
    0000             $TRAN   !FILESPEC,TPA$_EXIT,-           ; A file specification must
    0000                     MOV_FILESPEC                    ; follow.
    0000
    0000             $END_STATE                              ; End of syntax tables.
    0000
    0000     ;
    0000     ; Declare a code PSECT that will always link at the start of the image.
    0000     ;
    0000
00000000             .PSECT  $$$$00BOOT,LONG
```

```
                    0000   660
                    0000   661          .SHOW   EXPANSIONS
                    0000   662
                    0000   663          .DEFAULT DISPLACEMENT, WORD
```

```
0000            .SBTTL  SETUP_BOOT58 - Set up boot environment
0000
0000    ;++
0000    ; Functional description:
0000    ;
0000    ;       When this program gains control, no SCB or RPB exists. This
0000    ;       routine identifies space for an SCB in the first free page
0000    ;       of memory following this program. The routine fills each
0000    ;       longword in the SCB with the address of a fault handler.
0000    ;       Then the routine loads the SCB address into the SCBB processor
0000    ;       register.
0000    ;
0000    ;       If the user requested XDELTA via a software boot control flag,
0000    ;       the routine then loads 2 SCB longwords with XDELTA handlers,
0000    ;       and creates the first entry in the XDELTA breakpoint table.
0000    ;
0000    ;       If the boot flag requested an initial breakpoint, the routine
0000    ;       then executes a BPT instruction, which passes control to
0000    ;       XDELTA.
0000    ;
0000    ;       This routine then calls BOOT58 -- the command processor -- to
0000    ;       accept and process commands from the console terminal.
0000    ;
0000    ; Inputs:
0000    ;
0000    ;       R5      - software boot control flags
0000    ;
0000    ;               Bit     Meaning
0000    ;               ---     -------
0000    ;
0000    ;                5      RPB$V_BOOBPT.
0000    ;                       Bootstrap breakpoint. Stops BOOT58 in XDELTA
0000    ;                       before accepting commands.
0000    ;
0000    ;               11      RPB$V_NODEFBOO.
0000    ;                       Do not automatically execute a BOOT command
0000    ;                       on activation. (Default behavior is to a BOOT.)
0000    ;
0000    ;       R6      - address of device ROM driver subroutine
0000    ;
0000    ;       SP      - <base_address + ^X200> of 64kb of good memory
0000    ;
0000    ; Implicit inputs:
0000    ;
0000    ;       BOOT_FAULT      - address of a fault handler
0000    ;       BOOT_HIGH       - address of the first free byte beyond BOOT58
0000    ;                         code and data
0000    ;
0000    ;       When SETUP_BOOT58 gains control, physical memory looks like
0000    ;       the diagram below:
0000    ;
0000    ;       SP-^X200:       +----------------------------------------+
0000    ;                       |              boot block 0              |
0000    ;       SP:             +----------------------------------------+
0000    ;                       |                                        |
0000    ;                       |                 unused                 |
0000    ;                       |                                        |
                        0000  ;       SP+^XBE00:          +----------------------------------------+
                        0000  ;                           |       Primary bootstrap (BOOT58)       |
                        0000  ;       BOOTHIGH:           +----------------------------------------+
                        0000  ;                           |                                        |
                        0000  ;                           |                 unused                 |
                        0000  ;                           |                                        |
                        0000  ;                           +----------------------------------------+
                        0000  ;
                        0000  ; Implicit outputs:
                        0000  ;
                        0000  ;       DRIVER_SUBROUT   - address of the driver subroutine
                        0000  ;       START_ADDRESS    - <base of good memory + ^X200>
                        0000  ;       GOODMEM_BASE     - base address of 64K bytes of good memory
                        0000  ;       FIRST_FREE_BYTE  - address of first free byte past BOOT58
                        0000  ;       PR$_SCBB         - address of an SCB filled with handler address
                        0000  ;
                        0000  ;       When SETUP_BOOT58 exits to the BOOT58 command processor,
                        0000  ;       physical memory looks like the diagram below:
                        0000  ;
                        0000  ;       base+0:             +----------------------------------------+
                        0000  ;                           |              boot block 0              |
                        0000  ;       base+^X200:         +----------------------------------------+
                        0000  ;                           |                                        |
                        0000  ;                           |                 unused                 |
                        0000  ;                           |                                        |
                        0000  ;       base+^XC000:        +----------------------------------------+
                        0000  ;                           |                                        |
                        0000  ;                           |                 BOOT58                 |
                        0000  ;                           |                                        |
                        0000  ;       BOOTHIGH:           +----------------------------------------+
                        0000  ;                           |                 stack                  |
                        0000  ;       SP:                 +----------------------------------------+
                        0000  ;
                        0000  ;--
                        0000
            00000001    0000          .IF     NE,SAENVIRON            ; If operating standalone,
                        0000                                          ; include this routine.
                        0000
                        0000  SETUP_BOOT58:                           ; Prepare a boot environment.
                        0000
                        0000  ;
                        0000  ; Save the contents of R6. This is the address of the device ROM driver
                        0000  ; subroutine. BOOT58 needs this later to read files from the TU58
                        0000  ; device.
                        0000  ;
                        0000
080E'CF    56     D0    0000          MOVL    R6,DRIVER_SUBROUT       ; Save driver address.
                        0005
                        0005  ;
                        0005  ; The BOOT58 program is loaded at ^XC000 bytes past the start of good
                        0005  ; memory. This permits VMB or other primary bootstraps to be loaded at
                        0005  ; the familiar ^X200 offset. Adjust SP for now to create SCB and stack.
                        0005  ; Save address of the base of good memory, and default start address.
                        0005  ;
                        0005
0048'CF    5E     D0    0005          MOVL    SP,START_ADDRESS        ; Save original SP as user's
                        000A                                          ; default load address.
```

```
                 0024'CF    FE00 CE    9E  000A   779                 MOVAB   -^X200(SP),GOODMEM_BASE ; Save base of good memory too.
                      0000BE00 8F    C0  0011   780                 ADDL2   #<BOOT58_OFFSET-^X200>,-; Offset SP to address start of
                               5E        0017   781                         SP                      ; BOOT58 code.
                                         0018   782
                                         0018   783 ;
                                         0018   784 ; Reserve space for a System Control Block (SCB) immediately after the
                                         0018   785 ; BOOT58 code. Write the address of a machine check fault handler in
                                         0018   786 ; all vectors in the SCB. This handler is used during bootstrapping
                                         0018   787 ; except when the bootstrap code specifically writes a different
                                         0018   788 ; handler address in one of the SCB vectors.
                                         0018   789 ;
                                         0018   790 ; The low bit set in the address of the fault handler causes the
                                         0018   791 ; handler to execute on the interrupt stack.
                                         0018   792 ;
                                         0018   793
                      56    088D'CF    9E  0018   794                 MOVAB   BOOT_FAULT+1,R6         ; Get the address of a handler.
                      57    0200'CF    9E  001D   795                 MOVAB   BOOTHIGH+^X200,R7       ; Get the address of the first
                                         0022   796                                                 ; byte past the SCB.
                                         0022   797
                                         0022   798 FILL_SCB:                                       ; Fill the SCB.
                         77      56    D0  0022   799                 MOVL    R6,-(R7)                ; Write 1 vector.
                      57    01FF 8F    B3  0025   800                 BITW    #^X1FF,R7               ; Check for page boundary.
                               F6    12  002A   801                 BNEQ    FILL_SCB                ; Not yet. Write another vector.
                         11      57    DA  002C   802                 MTPR    R7,#PR$_SCBB            ; SCB full. Write SCB address
                                         002F   803                                                 ; into processor register.
                                         002F   804
                                         002F   805 ;
                                         002F   806 ; Create a stack, and save the address of the first free byte past the
                                         002F   807 ; space used by BOOT58 and its supporting environment.
                                         002F   808 ;
                                         002F   809
                      5E    0800 C7    9E  002F   810                 MOVAB   <4*^X200>(R7),SP        ; Create a 3 page stack.
                    0028'CF      5E    D0  0034   811                 MOVL    SP,FIRST_FREE_BYTE      ; Save address of 1st byte of
                                         0039   812                                                 ; free physical memory.
                                         0039   813
                                         0039   814 ;
                                         0039   815 ; If XDELTA is linked into this program, set up 2 XDELTA handlers in
                                         0039   816 ; the SCB -- for breakpoint and trace trap. Then initialize the XDELTA
                                         0039   817 ; breakpoint table, and, if requested, execute a breakpoint before
                                         0039   818 ; proceeding with the bootstrap.
                                         0039   819 ;
                                         0039   820
                               00000001  0039   821                 .IF     NE,SADEBUG              ; If XDELTA is linked, do next.
                   2C A7    0000'CF    9E  0039   822                 MOVAB   XDELBPT,^X2C(R7)        ; Plug BPT handler.
                   28 A7    0000'CF    9E  003F   823                 MOVAB   XDELTBIT,^X28(R7)       ; Plug trace trap handler.
                 0000'CF    0050'CF    9E  0045   824                 MOVAB   INI$BRK,XDELIBRK        ; Store initial breakpoint.
                      01 55      05    E1  004C   825                 BBC     #RPB$V_BOOBPT,R5,-      ; If no breakpoint is wanted,
                                         0050   826                         NOBRK                   ; just continue in BOOT58.
                                         0050   827
                                         0050   828 ;
                                         0050   829 ; Initial breakpoint. Registers usage is as follows:
                                         0050   830 ;
                                         0050   831 ;               R0-R5   - unchanged
                                         0050   832 ;               R6      - address (+1) of a bootstrap fault handler
                                         0050   833 ;               R7      - address of the SCB
                                         0050   834 ;               R8-R11  - unchanged
                                         0050   835 ;               AP-FP   - unchanged
                      0050   836 ;        SP      - address of a 3-page stack
                      0050   837 ;
                      0050   838
                      0050   839 INI$BRK::                                ; Breakpoint
                  03  0050   840          BPT                             ; Stop in XDELTA.
                      0051   841
                      0051   842 NOBRK:                                   ; Proceed with BOOT58.
                      0051   843          .ENDC                           ; End of XDELTA conditional.
                      0051   844
                      0051   845 ;
                      0051   846 ; The environment is okay. Now call the command processor.
                      0051   847 ;
                      0051   848
 0057'CF    00    FB  0051   849          CALLS   #0,BOOT58               ; Accept and process commands.
                  00  0056   850          HALT                            ; For now, just halt on return.
                      0057   851
                      0057   852          .ENDC                           ; End of standalone conditional.
```

```
                     0057          .SBTTL  BOOT58 - Process bootstrap commands
                     0057
                     0057  ;++
                     0057  ; Functional description:
                     0057  ;
                     0057  ;       The command processor saves current register values, sets a
                     0057  ;       command options longword to a default state, and then accepts
                     0057  ;       commands until a START command transfers control to some other
                     0057  ;       program, or the user types <control-P> to return control to the
                     0057  ;       CONSOLE program.
                     0057  ;
                     0057  ; Implicit inputs:
                     0057  ;
                     0057  ;       COMMAND_FLAGS   - a location to hold the default or modified
                     0057  ;                         command options.
                     0057  ;       PARAM_BLOCK     - address of the TPARSE parameter block. Fields
                     0057  ;                         of interest are the following:
                     0057  ;
                     0057  ;               TPA$L_COUNT     - # of longwords in block
                     0057  ;               TPA$L_OPTIONS   - TPARSE flag bits
                     0057  ;
                     0057  ;                                 TPA$M_BLANKS - treat blanks explicitly
                     0057  ;                                                instead of invisibly
                     0057  ;                                 TPA$M_ABBREV - permit abbreviations
                     0057  ;
                     0057  ;               TPA$L_STRINGCNT - # characters remaining in input string
                     0057  ;               TPA$L_STRINGPTR - address of remainder of input string
                     0057  ;               TPA$L_TOKENCNT  - # characters in current token
                     0057  ;               TPA$L_TOKENPTR  - address of current token
                     0057  ;               TPA$L_CHAR      - character matched by a single
                     0057  ;                                 character symbol type
                     0057  ;               TPA$L_NUMBER    - binary value of a numeric token
                     0057  ;               TPA$L_PARAM     - 32-bit parameter from state transition
                     0057  ;
                     0057  ;       TPA$K_LENGTH0   - # bytes in TPARSE parameter block
                     0057  ;       COMMAND_STRING  - buffer for input string
                     0057  ;       COMMAND_BUFFER  - buffer for a single line of input
                     0057  ;       CMD_BUFFER_SIZE - length of buffer for single line of input
                     0057  ;       BOO$GQ_CMDESC   - string descriptor for RMS input
                     0057  ;       KEY_TABLE       - address of TPARSE keyword table
                     0057  ;       BOOT58_TABLE    - address of TPARSE state table
                     0057  ;
                     0057  ; Outputs:
                     0057  ;
                     0057  ;       R0-FP   - original or user-modified values
                     0057  ;
                     0057  ;--
                     0057
               0FFC  0057          .ENTRY  BOOT58,-
                     0059                  ^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                     0059
                     0059  ;
                     0059  ; Save R1-PC on the stack. Store the stack address
                     0059  ; of saved R0 in own storage.
                     0059  ;
                     0059
0030'CF    5E    D0  0059          MOVL    SP,CURRENT_ADDRESS      ; Save SP in own storage.
```

```
              00    DD  005E   911              PUSHL   #0                      ; Then push a 0 to represent the
         0030'CF    DD  0060   912              PUSHL   CURRENT_ADDRESS         ; original PC, and push SP.
         3FFF 8F    BB  0064   913              PUSHR   #^M<R0,R1,R2,R3,R4,R5,- ; Save all the other registers
                        0068   914                      R6,R7,R8,R9,R10,R11,-   ; on the stack too.
                        0068   915                      AP,FP>
 0040'CF      5E    D0  0068   916              MOVL    SP,REGISTER_TABLE       ; Save address of saved register
                        006D   917                                              ; values.
                        006D   918
                        006D   919      ;
                        006D   920      ; Initialize the mask that describes default address interpretation
                        006D   921      ; and value display mode.
                        006D   922      ;
                        006D   923
         002C'CF    D4  006D   924              CLRL    COMMAND_FLAGS           ; Initialize command settings.
     00000100 8F    C8  0071   925              BISL    #CMD_M_PHYSICAL,-       ; Set to interpret addresses
         002C'CF        0077   926                      COMMAND_FLAGS           ; as physical.
 080A'CF      5E    D0  007A   927              MOVL    SP,L_OLD_STACKP         ; Save current stack pointer to
                        007F   928                                              ; allow restoration on
                        007F   929                                              ; exceptions.
 0809'CF      01    90  007F   930              MOVB    #1,B_ENVIRON_SAFE       ; Note that environment is
                        0084   931                                              ; initialized.
                        0084   932
         0054'CF    DE  0084   933              MOVAL   HELP_FILE_SPEC,-        ; Set up help fie descripter
         0062'CF        0088   934                      HELP_FILE_DESCRIP+4     ;
         0066'CF    DE  008B   935              MOVAL   DEFBOO_SPEC,-           ; Set up defalut boot command file spec
         0074'CF        008F   936                      DEFBOO_DESCRIP+4        ;
         0078'CF    DE  0092   937              MOVAL   BOOTFILE_SPEC,-         ; Set up optional boot command file spec
         0086'CF        0096   938                      BOOTFILE_DESCRIP+4      ;
                        0099   939
                        0099   940      READ_COMMAND:                           ; Main command processing loop.
57       0000'CF    9E  0099   941              MOVAB   PARAM_BLOCK,R7          ; Get parameter block address.
                        009E   942
                        009E   943      ;
                        009E   944      ; Initialize string buffer address and length in the TPARSE parameter
                        009E   945      ; block. Then transfer a 1 to n line command into the string buffer.
                        009E   946      ;
                        009E   947
           08 A7    D4  009E   948              CLRL    TPA$L_STRINGCNT(R7)     ; Initialize string length.
         01A3'CF    9E  00A1   949              MOVAB   COMMAND_STRING,-        ; Initialize string buffer
           0C A7        00A5   950                      TPA$L_STRINGPTR(R7)     ; address.
                        00A7   951
                        00A7   952      ;
                        00A7   953      ; Check for non-interactive input: if taking commands from an indirect
                        00A7   954      ; file, the file is in memory. Call a routine to get the next record.
                        00A7   955      ;
                        00A7   956
                        00A7   957      READ_A_LINE:                            ; Process one line.
              07    E1  00A7   958              BBC     #CMD_V_INDIRECT,-       ; If processing interactive
      31 002C'CF        00A9   959                      COMMAND_FLAGS,10$       ; commands, branch.
         01BD'CF    16  00AD   960              JSB     GET_A_RECORD            ; For indirect, get a record.
           53 50    E9  00B1   961              BLBC    R0,20$                  ; Branch if error
                        00B4   962      ;
                        00B4   963      ; Put out a <cr><lf>.
                        00B4   964      ;
              7E    7C  00B4   965              CLRQ    -(SP)                   ; Create a null descrptor
         07B8'CF    9F  00B6   966              PUSHAB  LINE_TERM               ; Address of <cr><lf>
 0000'CF      00    FB  00BA   967              CALLS   #0,BOO$READPROMPT       ; "Print" the <cr><lf>
```

```
          45 50   E9 00BF    968         BLBC    R0,20$                  ; Branch if error
                     00C2    969 ;
                     00C2    970 ; Echo the command line to the console.  A special ASCIZ string is put
                     00C2    971 ; on the end of the buffer to cause a <cr><lf> after printing the line.
                     00C2    972 ;
          51    62   9A 00C2  973         MOVZBL  (R2),R1                 ; Restore R1 (overwritten by BOO$READPROMPT)
    54    00DC'CF    9E 00C5  974         MOVAB   COMMAND_BUFFER+1,R4     ; Get address of first char
    50    54    51   C1 00CA  975         ADDL3   R1,R4,R0                ; Calculate address of last char
    60    07B8'CF    D0 00CE  976         MOVL    LINE_TERM,(R0)          ; Put line term past last char
                7E   7C 00D3  977         CLRQ    -(SP)                   ; Create null descripter
                54   DD 00D5  978         PUSHL   R4                      ; Push address of first char
    0000'CF     03   FB 00D7  979         CALLS   #3,BOO$READPROMPT       ; Echo command line
                29   11 00DC  980         BRB     20$                     ; Go check for success.
                        00DE  981
                        00DE  982 ;
                        00DE  983 ; If this is the first time thru and the 'disable default boot' flag is
                        00DE  984 ; not set, then execute a 'BOOT' command to invoke the DEFBOO command
                        00DE  985 ; file on the console TU58.  This action mimics that of the 11-780 on
                        00DE  986 ; reboot if the AUTO-RESTART switch is ON.
                        00DE  987 ;
                        00DE  988 ; Interactive input from console terminal:
                        00DE  989 ;
                        00DE  990 ; Load an input buffer address, length in bytes, and address of a prompt
                        00DE  991 ; string onto the stack. Then call a subroutine to prompt for and read
                        00DE  992 ; an input line from the terminal. If the read fails, return to the
                        00DE  993 ; caller with an error status code.
                        00DE  994 ;
                        00DE  995
                        00DE  996 10$:                                    ; Interactive input.
    52    00DB'CF    9E 00DE  997         MOVAB   COMMAND_BUFFER,R2       ; Get address of command buffer.
          50    05   D0 00E3  998         MOVL    #SAVED_R5,R0            ; Index for R5
   00000800 8F       D3 00E6  999         BITL    #RPB$M_NODEFBOO,-       ; Skip possible unattend boot if
     0040'DF40          00EC 1000                  @REGISTER_TABLE[R0]     ;  flag set in R5
                06   12 00F0 1001         BNEQ    15$
                0F   E3 00F2 1002         BBCS    #CMD_V_UNATTEND,-       ; If unattended, use the BOOT command
        002C'CF         00F4 1003                  COMMAND_FLAGS,-        ;  built into the command buffer
                13      00F7 1004                  GOT_A_LINE
                        00F8 1005 15$:
                52   DD 00F8 1006         PUSHL   R2                      ; Push address on stack.
       7E    C4 8F   9A 00FA 1007         MOVZBL  #CMD_BUFFER_SIZE,-(SP)  ; Push buffer size on stack.
       07AE'CF       9F 00FE 1008         PUSHAB  PROMPT_STRING           ; Push prompt address on stack.
                        0102 1009
                        0102 1010 ;
                        0102 1011 ; If debugging with DEBUG in a timesharing environment, set up an
                        0102 1012 ; RMS input descriptor for BOO$READPROMPT.
                        0102 1013 ;
                        0102 1014
            00000000    0102 1015         .IF     NE,TSDEBUG
                        0102 1016         CLRL    BOO$GQ_CMDESC           ; Zero the # chars in buffer.
                        0102 1017         .ENDC
                        0102 1018
    0000'CF     03   FB 0102 1019         CALLS   #3,BOO$READPROMPT       ; Prompt for and read an input
                        0107 1020                                         ; line.
                        0107 1021
                        0107 1022 20$:                                    ; Check for error on input.
          01 50   E8 0107 1023         BLBS    R0,GOT_A_LINE           ; Branch on success.
                04   04 010A 1024         RET                             ; Return to caller on failure.
```

```
                          010B  1025
                          010B  1026 ;
                          010B  1027 ; The command buffer holds an input line. Calculate the 1st free byte
                          010B  1028 ; in the output buffer. One character at a time, copy the characters
                          010B  1029 ; in the input buffer into the output buffer.
                          010B  1030 ;
                          010B  1031
                          010B  1032 GOT_A_LINE:                                     ; Process an input line.
            0C A7     C1  010B  1033         ADDL3   TPA$L_STRINGPTR(R7),-           ; Add start of output buffer to
         53 08 A7         010E  1034                 TPA$L_STRINGCNT(R7),R3          ; to count of characters in that
                          0111  1035                                                 ; buffer to point to free byte.
         50    82     9A  0111  1036         MOVZBL  (R2)+,R0                        ; Get length of input line.
               91     13  0114  1037         BEQL    READ_A_LINE                     ; If null line, get another.
         51    52     D0  0116  1038         MOVL    R2,R1                           ; Need input buffer address in
                          0119  1039                                                 ; R1 for a LOCC instruction.
                          0119  1040
                          0119  1041 ;
                          0119  1042 ; Pick up one character at a time. If a hyphen, this may be a
                          0119  1043 ; continuation line; branch to special handler. If an exclamation
                          0119  1044 ; point, this is a comment; skip characters until end of comment.
                          0119  1045 ; Otherwise, increment the character count, store the characters in
                          0119  1046 ; the output buffer, decrement the count of input characters left,
                          0119  1047 ; and, if count is nonzero, loop through here again.
                          0119  1048 ;
                          0119  1049
                          0119  1050 GET_A_CHARACTER:                                ; Loop to read characters.
         52    81     9A  0119  1051         MOVZBL  (R1)+,R2                        ; Get a character.
                          011C  1052 ;       CMPB    #^A/-/,R2                       ; Might this be continuation?
                          011C  1053 ;       BEQL    HYPHEN_IN_LINE                  ; Yes. Go process it.
         52    21     91  011C  1054         CMPB    #^A/!/,R2                       ; Is this a comment?
               0B     13  011F  1055         BEQL    BYPASS_COMMENT                  ; Yes. Go bypass it.
                          0121  1056
                          0121  1057 ;
                          0121  1058 ; Normal character. Increment count in TPARSE parameter block, and
                          0121  1059 ; write character to output buffer. Then loop for next character
                          0121  1060 ; unless input line exhausted.
                          0121  1061 ;
                          0121  1062
            08 A7     D6  0121  1063         INCL    TPA$L_STRINGCNT(R7)             ; Increment character count.
         83    52     90  0124  1064         MOVB    R2,(R3)+                        ; Write output character.
                          0127  1065
                          0127  1066 MORE_CHARS:                                     ; See if more characters.
            EF 50     F5  0127  1067         SOBGTR  R0,GET_A_CHARACTER              ; Decrement character count,
                          012A  1068                                                 ; branch if line not finished.
               50     11  012A  1069         BRB     PARSE_COMMAND                   ; Command all collected. Go
                          012C  1070                                                 ; parse the command.
                          012C  1071
                          012C  1072 ;
                          012C  1073 ; Comment character: skip all characters until another exclamation
                          012C  1074 ; point or end of line. A second exclamation point ends the comment,
                          012C  1075 ; and normal character processing can resume. End of line indicates
                          012C  1076 ; that the entire command is in, and the line can be parsed. Note that
                          012C  1077 ; the LOCC instruction updates R1 and R0 appropriately.
                          012C  1078 ;
                          012C  1079
                          012C  1080 BYPASS_COMMENT:                                 ; Skip a comment.
               50     D7  012C  1081         DECL    R0                              ; Decrement character count
```

```
                          012E   1082                                            ; for the comment mark.
      01 A1    50   21   3A 012E   1083           LOCC    #^A/!/,R0,1(R1)        ; Look for another "!".
                    47   13 0133   1084           BEQL    PARSE_COMMAND          ; None exists. Go parse command.
                    51   D6 0135   1085           INCL    R1                     ; Found one. Move to next char.
                    EE   11 0137   1086           BRB     MORE_CHARS             ; Continue getting characters.
                          0139   1087
                          0139   1088 ;
                          0139   1089 ; Line continuation character: save current output buffer pointer and
                          0139   1090 ; length for now. Scan characters after the hyphen. If all blanks until
                          0139   1091 ; a comment character or end of line, this is really a continuation
                          0139   1092 ; character. Otherwise, this is just a hyphen (with some other syntactic
                          0139   1093 ; value).
                          0139   1094 ;
                          0139   1095
                          0139   1096 HYPHEN_IN_LINE:                                ; See why a hyphen is here.
               54   53   D0 0139   1097           MOVL    R3,R4                  ; Save output buffer pointer.
           55  08   A7   D0 013C   1098           MOVL    TPA$L_STRINGCNT(R7),R5 ; Save output char. count.
               83   52   90 0140   1099           MOVB    R2,(R3)+               ; Write hyphen into output
                          0143   1100                                            ; string.
                08   A7   D6 0143   1101           INCL    TPA$L_STRINGCNT(R7)    ; And count the character.
                    1A   11 0146   1102           BRB     NEXT_CHAR              ; See if more characters.
                          0148   1103
                          0148   1104 ;
                          0148   1105 ; Another character in line. If blank, keep looking. If comment, skip
                          0148   1106 ; over the comment, and then keep looking. If anything but a blank,
                          0148   1107 ; assume the hyphen was NOT a line continuation, and resume normal
                          0148   1108 ; character processing.
                          0148   1109 ;
                          0148   1110
                          0148   1111 LOOK_FOR_BLANK:                                ; Check for blank or "!".
               52   81   9A 0148   1112           MOVZBL  (R1)+,R2               ; Get next character.
               83   52   90 014B   1113           MOVB    R2,(R3)+               ; Store in output string.
                08   A7   D6 014E   1114           INCL    TPA$L_STRINGCNT(R7)    ; Increment output count.
               52   20   91 0151   1115           CMPB    #^A/ /,R2              ; Is character a blank?
                    0C   13 0154   1116           BEQL    NEXT_CHAR              ; Yes. Move to next char.
               52   09   91 0156   1117           CMPB    #^A/    /,R2           ; Is character a tab?
                    07   13 0159   1118           BEQL    NEXT_CHAR              ; Yes. Move to next char.
               52   21   91 015B   1119           CMPB    #^A/!/,R2              ; Is character an "!"?
                    0F   13 015E   1120           BEQL    SKIP_COMMENT           ; Yes. Move past the comment.
                    C5   11 0160   1121           BRB     MORE_CHARS             ; No. This is not a line
                          0162   1122                                            ; continuation.
                          0162   1123
                          0162   1124 ;
                          0162   1125 ; Keep hunting for blank, non-blank, exclamation point, or end of line.
                          0162   1126 ; If character count is exhausted, fall through.
                          0162   1127 ;
                          0162   1128
                          0162   1129 NEXT_CHAR:                                     ; See if more characters.
                E3   50   F5 0162   1130           SOBGTR  R0,LOOK_FOR_BLANK      ; If a character, look at it.
                          0165   1131
                          0165   1132 ;
                          0165   1133 ; Found end of line. Restore the TPARSE parameter block command buffer
                          0165   1134 ; pointer and command character count to their state before the hyphen
                          0165   1135 ; was found. Then go on to read another line.
                          0165   1136 ;
                          0165   1137
                          0165   1138 END_OF_LINE:                                   ; Found end of line.
```

```
                     53   54   D0  0165  1139          MOVL    R4,R3                   ; Restore saved pointer to
                  08 A7   55   D0  0168  1140          MOVL    R5,TPA$L_STRINGCNT(R7)  ; command string and count.
                     FF38      31  016C  1141          BRW     READ_A_LINE             ; Read another line.
                                   016F  1142
                                   016F  1143 ;
                                   016F  1144 ; After a hyphen, found a comment delimiter. Search for a comment
                                   016F  1145 ; ending delimiter. If find one, go on looking for a blank or non-blank
                                   016F  1146 ; to interpret the hyphen. If end of line, just restore command
                                   016F  1147 ; pointers and read next line.
                                   016F  1148 ;
                                   016F  1149
                                   016F  1150 SKIP_COMMENT:                            ; Skip command after hyphen.
                          50   D7  016F  1151          DECL    R0                      ; Ignore the exclamation point.
            01 A1    50   21   3A  0171  1152          LOCC    #^A/!/,R0,1(R1)         ; Is there another "!"?
                          ED   13  0176  1153          BEQL    END_OF_LINE             ; No. End of line. Go to next.
                          51   D6  0178  1154          INCL    R1                      ; Yes. Move past it.
                          E6   11  017A  1155          BRB     NEXT_CHAR               ; And keep looking for blank.
                                   017C  1156
                                   017C  1157 ;
                                   017C  1158 ; Parse: initialize parsing state. Push the address of the keyword
                                   017C  1159 ; table, the state table, and the TPARSE parameter block onto the
                                   017C  1160 ; stack, and call TPARSE.
                                   017C  1161 ;
                                   017C  1162
                                   017C  1163 PARSE_COMMAND:                           ; Command is all here. Parse it.
                          08   D0  017C  1164          MOVL    #TPA$K_COUNT0,-         ; ???
                          67       017E  1165                  TPA$L_COUNT(R7)
                          02   C8  017F  1166          BISL    #TPA$M_ABBREV,-         ; Permit abbreviations in the
                       04 A7       0181  1167                  TPA$L_OPTIONS(R7)       ; command keywords.
                     0000'CF   9F  0183  1168          PUSHAB  KEY_TABLE               ; Pass address of keyword table,
                     0000'CF   9F  0187  1169          PUSHAB  BOOT58_TABLE            ; state table, and
                          57   DD  018B  1170          PUSHL   R7                      ; TPARSE parameter block.
             0000'CF      03   FB  018D  1171          CALLS   #3,LIB$TPARSE           ; Parse the command.
                  0808'CF      E8  0192  1172          BLBS    B_ERROR_OUT,-           ; If error message already
                          16       0196  1173                  CLEAR_ERRBIT            ; output, get next command.
                       17 50   E8  0197  1174          BLBS    R0,NEXT_COMMAND         ; If success, get another.
                                   019A  1175          MSG     <-E-Syntax error>       ; Output error message.
                       00B6    30  019A                BSBW    BOO$FACMSG
72 65 20 78 61 74 6E 79 53 2D 45   2D  019D                .ASCIZ  \-E-Syntax error\
                    00 72 6F   72  01A9
                                   01AD
                                   01AD  1176
                                   01AD  1177 CLEAR_ERRBIT:                            ; Clear flag.
                  0808'CF      94  01AD  1178          CLRB    B_ERROR_OUT             ; Clear error output flag.
                                   01B1  1179
                                   01B1  1180 ;
                                   01B1  1181 ; Branch back through the command loop.
                                   01B1  1182 ;
                                   01B1  1183
                                   01B1  1184 NEXT_COMMAND:                            ; Process another command.
                                   01B1  1185 ;
                                   01B1  1186 ; Make sure the command flag was cleared.  The INSV instruction
                                   01B1  1187 ; will clear all the bits in COMMAND_FLAGS that indicate that a
                                   01B1  1188 ; command is awaiting execution.
                                   01B1  1189 ;
                          50   D4  01B1  1190          CLRL    R0                      ; Generate 32 bits of 0's
                          50   F0  01B3  1191          INSV    R0,-                    ; Source
                    01B5  1192                  #CMD_V_LOADCMD,-        ; Starting position
      07   00       01B5  1193                  #NUM_OF_CMDS,-          ; Length
      002C'CF       01B7  1194                  COMMAND_FLAGS           ; Destination
         FEDC   31  01BA  1195          BRW     READ_COMMAND
```

```
                     01BD          .SBTTL  GET_A_RECORD - Extracts an RT-11 format record
                     01BD
                     01BD  ;++
                     01BD  ; Functional description:
                     01BD  ;
                     01BD  ;       One block of the command file is in memory. A pointer indicates
                     01BD  ;       the next byte to be read. This routine collects a record by
                     01BD  ;       reading a character a time from memory. If end of block is
                     01BD  ;       reached, this routine reads in the next block (if any).
                     01BD  ;
                     01BD  ;       At end of file, this routine turns off the indirect command
                     01BD  ;       file processing flag, and returns a success status code. The
                     01BD  ;       outer parser will process the null command and then prompt
                     01BD  ;       for further interactive input.
                     01BD  ;
                     01BD  ;       RT-11 test files are in ASCII stream format. The format is as
                     01BD  ;       follows:
                     01BD  ;
                     01BD  ;               no character count associated with the record
                     01BD  ;               the record begins with the ASCII text
                     01BD  ;               a record ends in a FF, LF, or VT
                     01BD  ;               bytes containing CR or null are ignored
                     01BD  ;
                     01BD  ; Implicit inputs:
                     01BD  ;
                     01BD  ;       IND_CMDBUF_PTR  - contains address of next byte to read
                     01BD  ;       IND_CMDBUFFER   - starting buffer address of command file buffer
                     01BD  ;       512             - number of bytes in command file buffer
                     01BD  ;       IND_W_NEXT_LBN  - next LBN in the command file
                     01BD  ;       IND_W_BLKS_LEFT - blocks left to read from the command file
                     01BD  ;
                     01BD  ; Outputs:
                     01BD  ;
                     01BD  ;       This routine preserves registers R5-R11.
                     01BD  ;
                     01BD  ; Implicit outputs:
                     01BD  ;
                     01BD  ;       COMMAND_BUFFER  - byte 0 is the record size in bytes
                     01BD  ;                         bytes 1-n are the ASCII text of the record
                     01BD  ;                         buffer contains no FFs, LFs, CRs, or VTs
                     01BD  ;
                     01BD  ;       The static variables that point to the indirect command file
                     01BD  ;       and its data are updated. These variables are:
                     01BD  ;
                     01BD  ;               IND_CMDBUF_PTR
                     01BD  ;               IND_CMDBUFFER
                     01BD  ;               IND_W_NEXT_LBN
                     01BD  ;               IND_W_BLKS_LEFT
                     01BD  ;
                     01BD  ;--
                     01BD
                     01BD  GET_A_RECORD:                                   ; Collect 1 record.
          51     D4  01BD          CLRL    R1                              ; Clear character count.
53   07A3'CF     D0  01BF          MOVL    IND_CMDBUF_PTR,R3               ; Get source address.
52   00DC'CF     9E  01C4          MOVAB   COMMAND_BUFFER+1,R2             ; Get destination address.
54   07A3'CF     9E  01C9          MOVAB   IND_CMDBUFFER+512,R4            ; Get address of 1 byte past end
                     01CE                                                  ; of buffer.
```

```
                                01CE
                                01CE  GET_CHAR:                                     ; Read 1 character.
               54    53   D1    01CE          CMPL    R3,R4                         ; Are we at the end of buffer?
                     47   1F    01D1          BLSSU   20$                           ; No. Branch to get character.
               07A7'CF    B5    01D3          TSTW    IND_W_BLKS_LEFT               ; Any blocks left to read?
                     61   15    01D7          BLEQ    END_OF_FILE                   ; No. Process end of file.
                     06   BB    01D9          PUSHR   #^M<R1,R2>                    ; Save R1 and R2
               05A3'CF    9F    01DB          PUSHAB  IND_CMDBUFFER                 ; Send address of buffer for a
               07A9'CF    DD    01DF          PUSHL   IND_W_NEXT_LBN                ; block, and an LBN.
               07A9'CF    B6    01E3          INCW    IND_W_NEXT_LBN                ; Increment next block number.
               07A7'CF    B7    01E7          DECW    IND_W_BLKS_LEFT               ; Decrement blocks left.
          0000'CF    02   FB    01EB          CALLS   #2,FIL$READ_LBN               ; Read a block.
                     06   BA    01F0          POPR    #^M<R1,R2>                    ; Restore R1 and R2
               19    50   E8    01F2          BLBS    R0,10$                        ; Branch on success.
                                01F5          MSG     <-E-Cannot read file>
                   005B   30    01F5          BSBW    BOO$FACMSG
65 72 20 74 6F 6E 6E 61 43 2D 45 2D    01F8          .ASCIZ  \-E-Cannot read file\
      00 65 6C 69 66 20 64 61    0204
                                020C
                     44   11    020C          BRB     EXIT_GETRECORD                ; Return with the error.
                                020E
                                020E  10$:                                          ; New block of file in memory.
               05A3'CF    DE    020E          MOVAL   IND_CMDBUFFER,-               ; Set up buffer pointer.
               07A3'CF          0212                  IND_CMDBUF_PTR
         53    07A3'CF    D0    0215          MOVL    IND_CMDBUF_PTR,R3             ; Set up in register too.
                                021A
                                021A  ;
                                021A  ; Register usage below is as follows:
                                021A  ;
                                021A  ;               R0      - holds a character
                                021A  ;               R1      - count of characters collected so far
                                021A  ;               R2      - address of next free byte in output buffer
                                021A  ;               R3      - address of next byte to read
                                021A  ;
                                021A
                                021A  20$:                                          ; Buffer is okay. Get a char.
               50    83   9A    021A          MOVZBL  (R3)+,R0                      ; Get a character.
                     AF   13    021D          BEQL    GET_CHAR                      ; Skip nulls.
               0D    50   91    021F          CMPB    R0,#CAR_RETURN                ; Carriage return?
                     AA   13    0222          BEQL    GET_CHAR                      ; Skip them too.
               0A    50   91    0224          CMPB    R0,#LINE_FEED                 ; Line feed?
                     17   13    0227          BEQL    END_OF_RECORD                 ; Yes. Branch.
               0B    50   91    0229          CMPB    R0,#VERTICAL_TAB              ; Vertical tab?
                     12   13    022C          BEQL    END_OF_RECORD                 ; Yes. Branch.
               0C    50   91    022E          CMPB    R0,#FORM_FEED                 ; Form feed?
                     0D   13    0231          BEQL    END_OF_RECORD                 ; Yes. Branch.
                     51   D6    0233          INCL    R1                            ; Increment character count.
               82    50   90    0235          MOVB    R0,(R2)+                      ; Save the character.
                     94   11    0238          BRB     GET_CHAR                      ; Get the next character.
                                023A
                                023A  ;
                                023A  ; End of file has been reached. Turn off the indirect command file
                                023A  ; processing flag, and return with success to caller.
                                023A  ;
                                023A
                                023A  END_OF_FILE:                                  ; End of command file.
               80 8F      8A    023A          BICB    #CMD_M_INDIRECT,-             ; Clear command file flag in
         002C'CF          023D  1307                  COMMAND_FLAGS           ; command flag longword.
                          0240  1308
                          0240  1309 END_OF_RECORD:                           ; End of record seen.
    00DB'CF    51    90   0240  1310         MOVB     R1,COMMAND_BUFFER       ; Store record count.
    52    00DB'CF    9E   0245  1311         MOVAB    COMMAND_BUFFER,R2       ; Restore output buffer address
                          024A  1312                                          ; in a register.
    07A3'CF    53    D0   024A  1313         MOVL     R3,IND_CMDBUF_PTR       ; Update buffer pointer.
                          024F  1314
                          024F  1315 RETURN_RECORD:                           ; Successful record collection.
         50    01    3C   024F  1316         MOVZWL   #SS$_NORMAL,R0          ; Set success status code.
                          0252  1317
                          0252  1318 EXIT_GETRECORD:                          ; Restore registers and return.
                     05   0252  1319         RSB                              ; Return.
```

```
                         0253                 .SBTTL  Output message routines
                         0253
                         0253        ;++
                         0253        ; BOO$FACMSG    - Output facility-specific error message
                         0253        ;
                         0253        ; Functional description:
                         0253        ;
                         0253        ;          Calls BOO$MSGOUT to output an error message preceded by a
                         0253        ;          new line and facility name string.
                         0253        ;
                         0253        ; Inputs:
                         0253        ;
                         0253        ;          0(SP)    - address of an ASCIZ message text
                         0253        ;
                         0253        ; Outputs:
                         0253        ;
                         0253        ;          This routine preserves all registers.
                         0253        ;
                         0253        ;--
                         0253
                         0253        BOO$FACMSG::
             000D   30   0253                 BSBW    BOO$MSGOUT                  ; First output facility name.
                0A  0D   0256                 .ASCII  <CAR_RETURN><LINE_FEED> ; New line.
 00 38 35 54 4F 4F 42 25   0258                 .ASCIZ  /%BOOT58/                   ; Facility name.
             0000   31   0260                 BRW     BOO$MSGOUT                  ; Now output message.
                         0263
                         0263        ;++
                         0263        ;
                         0263        ; BOO$MSGOUT    - Output message on terminal
                         0263        ;
                         0263        ; Functional description:
                         0263        ;
                         0263        ;          Outputs a message on the console terminal.
                         0263        ;
                         0263        ; Inputs:
                         0263        ;
                         0263        ;          0(SP)    - the address of an ASCIZ message string
                         0263        ;
                         0263        ; Outputs:
                         0263        ;
                         0263        ;          B_ERROR_OUT      - has low bit set to indicate that a message
                         0263        ;                             has been output to the terminal
                         0263        ;
                         0263        ;--
                         0263
                         0263        BOO$MSGOUT:                                          ; Display message on terminal.
              7E    7C   0263                 CLRQ    -(SP)                       ; Create a null descriptor.
           08 AE    DD   0265                 PUSHL   8(SP)                       ; Pass as address of buffer.
     0000'CF   03   FB   0268                 CALLS   #3,BOO$READPROMPT           ; Output message.
 9E  FA00 8F   00   3A   026D                 LOCC    #0,#64000,@(SP)+            ; Look for zero at end of ASCIZ
                         0273                                                     ; message string.
     0808'CF   01   90   0273                 MOVB    #1,B_ERROR_OUT              ; Set a flag saying message has
                         0278                                                     ; been sent to terminal.
           01 A1    17   0278                 JMP     1(R1)                       ; Return to caller.
```

```
                        027B             .SBTTL  EXECUTE_COMMAND - Execute a single command
                        027B
                        027B     ;++
                        027B     ; Functional description:
                        027B     ;
                        027B     ;       Determines from the COMMAND_FLAGS settings what command is to
                        027B     ;       be executed. Executes that command, clears the flag bit, and
                        027B     ;       returns.
                        027B     ;
                        027B     ; Inputs:
                        027B     ;
                        027B     ;       AP points to the TPARSE parameter block, which is to be passed
                        027B     ;       along intact to the command-specific action routine.
                        027B     ;
                        027B     ;       COMMAND_FLAGS indicates by a bit setting which command is to
                        027B     ;       be executed.
                        027B     ;
                        027B     ; Outputs:
                        027B     ;
                        027B     ;       R0      - return status from the command execution routine
                        027B     ;
                        027B     ;       This routine BRWs to the relevant routine, and that routine
                        027B     ;       returns to EXECUTE_COMMAND's caller.
                        027B     ;
                        027B     ;--
                        027B
                  0FFC  027B             .ENTRY  EXECUTE_COMMAND,-
                        027D                     ^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                        027D
             00     EA  027D             FFS     #CMD_V_LOADCMD,-          ; Get the command bit.
             06         027F                     #CMD_V_CMDFILCMD,-
     50   002C'CF       0280                     COMMAND_FLAGS,R0
  00 002C'CF   50   E5  0284             BBCC    R0,COMMAND_FLAGS,10$      ; Clear the bit.
                        028A
                        028A     10$:
                        028A             CASE    R0,TYPE=B,<-              ; Case on the command.
                        028A                     LOAD_FILE,-               ; Load a file.\
                        028A                     START_PROGRAM,-           ; Start a program.
                        028A                     EXAMINE_LOC,-             ; Examine a location.\
                        028A                     DEPOSIT_DATA,-            ; Deposit data.
                        028A                     PRINT_HELP,-              ; Print help text at console.
                        028A                     BOOT_OP,-                 ; Boot the system
                        028A                     EXECUTE_FILE>             ; Execute a command file.
     06'   00   50  8F  028A             CASEB   R0,#0,S^#<<30001$-30000$>/2>-1
                        028E     30000$:
                        028E             .IRP    EP,<            LOAD_FILE,            START_PROGRAM,          EXAM
                        028E             .SIGNED_WORD    EP-30000$
                        028E             .ENDR
                 00B4'  028E             .SIGNED_WORD    LOAD_FILE-30000$
                        0290
                 0194'  0290             .SIGNED_WORD    START_PROGRAM-30000$
                        0292
                 036E'  0292             .SIGNED_WORD    EXAMINE_LOC-30000$
                        0294
                 043F'  0294             .SIGNED_WORD    DEPOSIT_DATA-30000$
                        0296
                 0515'  0296             .SIGNED_WORD    PRINT_HELP-30000$
```

```
                                          0298
                                   0580'  0298                .SIGNED_WORD    BOOT_UP-30000$
                                          029A
                                   0467'  029A                .SIGNED_WORD    EXECUTE_FILE-30000$
                                          029C
                                          029C         30001$:
                                          029C
                                          029C  1419
                                          029C  1420   ;
                                          029C  1421   ; If none of the above, report a fatal error.
                                          029C  1422   ;
                                          029C  1423
                                          029C  1424           MSG     <-F-Parsing error>        ; Report parsing error.
                         FFB4       30    029C                 BSBW    BOO$FACMSG
65 20 67 6E 69 73 72 61 50 2D 46 2D       029F                 .ASCIZ  \-F-Parsing error\
                     00 72 6F 72 72       02AB
                                          02B0
                                    00    02B0  1425           HALT                              ; Just halt.
```

```
                      02B1          .SBTTL  SET_LOAD_FLAG - Sets the LOAD command flag.
                      02B1
                      02B1  ;++
                      02B1  ; Functional description:
                      02B1  ;
                      02B1  ;       Sets the CMD_M_LOADCMD in COMMAND_FLAGS.
                      02B1  ;
                      02B1  ; Implicit inputs:
                      02B1  ;
                      02B1  ;       COMMAND_FLAGS   - holds command interpretation flags
                      02B1  ;
                      02B1  ; Outputs:
                      02B1  ;
                      02B1  ;       R0      - contains SS$_NORMAL
                      02B1  ;
                      02B1  ;       CMD_M_LOADCMD is set in COMMAND_FLAGS
                      02B1  ;
                      02B1  ;--
                      02B1
              0FFC    02B1          .ENTRY  SET_LOAD_FLAG,-
                      02B3                  ^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                      02B3
         01     C8    02B3          BISL    #CMD_M_LOADCMD,-        ; Set the LOAD command flag.
   002C'CF            02B5                  COMMAND_FLAGS
   50    01     3C    02B8          MOVZWL  #SS$_NORMAL,R0          ; Set success status code.
                04    02BB          RET
```

```
                   02BC            .SBTTL  SET_START_FLAG - Sets the START command flag.
                   02BC
                   02BC   ;++
                   02BC   ; Functional description:
                   02BC   ;
                   02BC   ;        Sets the CMD_M_STARTCMD in COMMAND_FLAGS.
                   02BC   ;
                   02BC   ; Implicit inputs:
                   02BC   ;
                   02BC   ;        COMMAND_FLAGS   - holds command interpretation flags
                   02BC   ;
                   02BC   ; Outputs:
                   02BC   ;
                   02BC   ;        R0      - contains SS$_NORMAL
                   02BC   ;
                   02BC   ;        CMD_M_STARTCMD is set in COMMAND_FLAGS
                   02BC   ;
                   02BC   ;--
                   02BC
             0FFC  02BC            .ENTRY  SET_START_FLAG,-
                   02BE                    ^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                   02BE
         02    C8  02BE            BISL    #CMD_M_STARTCMD,-          ; Set the START command flag.
    002C'CF        02C0                    COMMAND_FLAGS
    50   01    3C  02C3            MOVZWL  #SS$_NORMAL,R0             ; Set success status code.
               04  02C6            RET
```

```
                              02C7  1481              .SBTTL  SET_EXAM_FLAG - Sets the EXAMINE command flag.
                              02C7  1482
                              02C7  1483      ;++
                              02C7  1484      ; Functional description:
                              02C7  1485      ;
                              02C7  1486      ;       Sets the CMD_M_EXAMCMD in COMMAND_FLAGS.
                              02C7  1487      ;
                              02C7  1488      ; Implicit inputs:
                              02C7  1489      ;
                              02C7  1490      ;       COMMAND_FLAGS   - holds command interpretation flags
                              02C7  1491      ;
                              02C7  1492      ; Outputs:
                              02C7  1493      ;
                              02C7  1494      ;       R0      - contains SS$_NORMAL
                              02C7  1495      ;
                              02C7  1496      ;       CMD_M_EXAMCMD is set in COMMAND_FLAGS
                              02C7  1497      ;
                              02C7  1498      ;--
                              02C7  1499
                        0FFC  02C7  1500              .ENTRY  SET_EXAM_FLAG,-
                              02C9  1501                      ^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                              02C9  1502
                  04      C8  02C9  1503              BISL    #CMD_M_EXAMCMD,-         ; Set the EXAMINE command flag.
             002C'CF          02CB  1504                      COMMAND_FLAGS
             50   01      3C  02CE  1505              MOVZWL  #SS$_NORMAL,R0           ; Set success status code.
                          04  02D1  1506              RET
```

```
                   02D2          .SBTTL  SET_DEPOS_FLAG - Sets the DEPOSIT command flag.
                   02D2
                   02D2   ;++
                   02D2   ; Functional description:
                   02D2   ;
                   02D2   ;       Sets the CMD_M_DEPOSCMD in COMMAND_FLAGS.
                   02D2   ;
                   02D2   ; Implicit inputs:
                   02D2   ;
                   02D2   ;       COMMAND_FLAGS   - holds command interpretation flags
                   02D2   ;
                   02D2   ; Outputs:
                   02D2   ;
                   02D2   ;       R0       - contains SS$_NORMAL
                   02D2   ;
                   02D2   ;       CMD_M_DEPOSCMD is set in COMMAND_FLAGS
                   02D2   ;
                   02D2   ;--
                   02D2
             0FFC  02D2          .ENTRY  SET_DEPOS_FLAG,-
                   02D4                  ^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                   02D4
        08     C8  02D4          BISL    #CMD_M_DEPOSCMD,-        ; Set the DEPOSIT command flag.
  002C'CF          02D6                  COMMAND_FLAGS
  50    01     3C  02D9          MOVZWL  #SS$_NORMAL,R0           ; Set success status code.
               04  02DC          RET
```

```
                    02DD  1535          .SBTTL  SET_HELP_FLAG - Sets the HELP command flag.
                    02DD  1536
                    02DD  1537  ;++
                    02DD  1538  ; Functional description:
                    02DD  1539  ;
                    02DD  1540  ;       Sets the CMD_M_HELPCMD in COMMAND_FLAGS.
                    02DD  1541  ;
                    02DD  1542  ; Implicit inputs:
                    02DD  1543  ;
                    02DD  1544  ;       COMMAND_FLAGS   - holds command interpretation flags
                    02DD  1545  ;
                    02DD  1546  ; Outputs:
                    02DD  1547  ;
                    02DD  1548  ;       R0      - contains SS$_NORMAL
                    02DD  1549  ;
                    02DD  1550  ;       CMD_M_HELPCMD is set in COMMAND_FLAGS
                    02DD  1551  ;
                    02DD  1552  ;--
                    02DD  1553
              0FFC  02DD  1554          .ENTRY  SET_HELP_FLAG,-
                    02DF  1555                  ^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                    02DF  1556
         10     C8  02DF  1557          BISL    #CMD_M_HELPCMD,-        ; Set the HELP command flag.
    002C'CF         02E1  1558                  COMMAND_FLAGS
    50   01     3C  02E4  1559          MOVZWL  #SS$_NORMAL,R0          ; Set success status code.
                04  02E7  1560          RET
```

```
                        02E8  1562          .SBTTL  SET_BOOT_FLAG - Sets the BOOT flag.
                        02E8  1563
                        02E8  1564  ;++
                        02E8  1565  ; Functional description:
                        02E8  1566  ;
                        02E8  1567  ;       Sets the CMD_M_BOOTCMD in COMMAND_FLAGS.
                        02E8  1568  ;
                        02E8  1569  ; Implicit inputs:
                        02E8  1570  ;
                        02E8  1571  ;       COMMAND_FLAGS   - holds command interpretation flags
                        02E8  1572  ;
                        02E8  1573  ; Outputs:
                        02E8  1574  ;
                        02E8  1575  ;       R0      - contains SS$_NORMAL
                        02E8  1576  ;
                        02E8  1577  ;       CMD_M_BOOTCMD is set in COMMAND_FLAGS
                        02E8  1578  ;
                        02E8  1579  ;--
                        02E8  1580
                  0FFC  02E8  1581          .ENTRY  SET_BOOT_FLAG,-
                        02EA  1582                  ^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                        02EA  1583
            20     C8   02EA  1584          BISL    #CMD_M_BOOTCMD,-        ; Set the BOOT COMMAND flag.
       002C'CF          02EC  1585                  COMMAND_FLAGS
       50   01     3C   02EF  1586          MOVZWL  #SS$_NORMAL,R0          ; Set success status code.
                   04   02F2  1587          RET
```

```
                      02F3  1589          .SBTTL  SET_CMDFIL_FLAG - Sets the COMMAND FILE flag.
                      02F3  1590
                      02F3  1591  ;++
                      02F3  1592  ; Functional description:
                      02F3  1593  ;
                      02F3  1594  ;       Sets the CMD_M_CMDFILCMD in COMMAND_FLAGS.
                      02F3  1595  ;
                      02F3  1596  ; Implicit inputs:
                      02F3  1597  ;
                      02F3  1598  ;       COMMAND_FLAGS   - holds command interpretation flags
                      02F3  1599  ;
                      02F3  1600  ; Outputs:
                      02F3  1601  ;
                      02F3  1602  ;       R0      - contains SS$_NORMAL
                      02F3  1603  ;
                      02F3  1604  ;       CMD_M_CMDFILCMD is set in COMMAND_FLAGS
                      02F3  1605  ;
                      02F3  1606  ;--
                      02F3  1607
                OFFC  02F3  1608          .ENTRY  SET_CMDFIL_FLAG,-
                      02F5  1609                  ^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                      02F5  1610
00000040 8F      C8   02F5  1611          BISL    #CMD_M_CMDFILCMD,-      ; Set the COMMAND FILE flag.
    002C'CF           02FB  1612                  COMMAND_FLAGS
    50   01      3C   02FE  1613          MOVZWL  #SS$_NORMAL,R0          ; Set success status code.
                 04   0301  1614          RET
```

```
                              0302              .SBTTL  MOV_FILESPEC - Pick up file specification
                              0302
                              0302      ;++
                              0302      ; Functional description:
                              0302      ;
                              0302      ;       Moves the full file specification from the input string into
                              0302      ;       a buffer that can be read by the file handling utilities.
                              0302      ;
                              0302      ; Implicit inputs:
                              0302      ;
                              0302      ;       AP points to the TPARSE parameter block, containing:
                              0302      ;
                              0302      ;       TPA$L_TOKENCNT  - number of characters in file specification
                              0302      ;       TPA$L_TOKENPTR  - address of the file specification
                              0302      ;
                              0302      ; Implicit outputs:
                              0302      ;
                              0302      ;       FILE_SPEC       - holds the file specification from the input
                              0302      ;                         command.
                              0302      ;       FILE_DESCRIP    - the 1st word of this quadword holds the
                              0302      ;                         length of the file specification string;
                              0302      ;                         the 2nd longword holds the address of the
                              0302      ;                         file specification string.
                              0302      ;
                              0302      ;--
                              0302
                        0FFC  0302              .ENTRY  MOV_FILESPEC,-
                              0304                      ^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                              0304
     50     14 AC       D0    0304              MOVL    TPA$L_TOKENPTR(AP),R0   ; Get address of input file
                              0308                                              ; specification string.
            10 AC       28    0308              MOVC3   TPA$L_TOKENCNT(AP),-    ; Move file specification
   009B'CF     60             030B                      (R0),FILE_SPEC          ; string into own storage.
   51    004C'CF        DE    030F              MOVAL   FILE_DESCRIP,R1         ; Get address of descriptor.
            10 AC       D0    0314              MOVL    TPA$L_TOKENCNT(AP),-    ; Load length field.
               61             0317                      DSC$W_LENGTH(R1)
         009B'CF        DE    0318              MOVAL   FILE_SPEC,-             ; Load address field.
            04 A1             031C                      DSC$A_POINTER(R1)
     50     01          3C    031E              MOVZWL  #SS$_NORMAL,R0          ; Return success status code.
                        04    0321              RET
```

```
                      0322          .SBTTL  SAV_DEVSPEC - Pick up device specification
                      0322
                      0322 ;++
                      0322 ; Functional description:
                      0322 ;
                      0322 ;        Moves a device specification from the input string into
                      0322 ;        a buffer that can be read by the file handling utilities.
                      0322 ;
                      0322 ; Implicit inputs:
                      0322 ;
                      0322 ;        AP points to the TPARSE parameter block, containing:
                      0322 ;
                      0322 ;        TPA$L_TOKENCNT  - number of characters in file specification
                      0322 ;        TPA$L_TOKENPTR  - address of the file specification
                      0322 ;
                      0322 ; Implicit outputs:
                      0322 ;
                      0322 ;        DEV_SPEC        - holds the device specification from the input
                      0322 ;                          command.
                      0322 ;        DEV_DESCRIP     - the 1st word of this quadword holds the
                      0322 ;                          length of the device specification string;
                      0322 ;                          the 2nd longword holds the address of the
                      0322 ;                          device specification string.
                      0322 ;
                      0322 ;--
                      0322
                0FFC  0322          .ENTRY  SAV_DEVSPEC,-
                      0324                  ^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                      0324
  50    14 AC     D0  0324          MOVL    TPA$L_TOKENPTR(AP),R0   ; Get address of input file
                      0328                                          ; specification string.
        10 AC     28  0328          MOVC3   TPA$L_TOKENCNT(AP),-    ; Move device specification
008A'CF    60         032B                  (R0),DEV_SPEC           ; string into own storage.
  51  008F'CF     DE  032F          MOVAL   DEV_DESCRIP,R1          ; Get address of descriptor.
        10 AC     D0  0334          MOVL    TPA$L_TOKENCNT(AP),-    ; Load length field.
           61         0337                  DSC$W_LENGTH(R1)
      008A'CF     DE  0338          MOVAL   DEV_SPEC,-              ; Load address field.
        04 A1         033C                  DSC$A_POINTER(R1)
     50    01     3C  033E          MOVZWL  #SS$_NORMAL,R0          ; Return success status code.
                  04  0341          RET
```

```
                                  0342  1698            .SBTTL  LOAD_FILE - Load file into memory
                                  0342  1699
                                  0342  1700 ;++
                                  0342  1701 ; Functional description:
                                  0342  1702 ;
                                  0342  1703 ;          Opens a file and loads it into memory at the specified or
                                  0342  1704 ;          default physical address.
                                  0342  1705 ;
                                  0342  1706 ; Implicit inputs:
                                  0342  1707 ;
                                  0342  1708 ;          START_ADDRESS    - address in which to load the file
                                  0342  1709 ;          FILE_DESCRIP     - string descriptor of the file
                                  0342  1710 ;          CHANNEL_NUMBER   - address into which to store a channel number
                                  0342  1711 ;
                                  0342  1712 ;          GOODMEM_BASE     - base address of 64K bytes of good memory
                                  0342  1713 ;          FIRST_FREE_BYTE  - address of first free byte past BOOT58 space;
                                  0342  1714 ;                             this address is past BOOT58, BOOT58's SCB, and
                                  0342  1715 ;                             3-page stack.
                                  0342  1716 ;
                                  0342  1717 ;--
                                  0342  1718
                                  0342  1719 LOAD_FILE:
                         7E   7C  0342  1720            CLRQ    -(SP)                           ; Clear space for a file
                         5E   DD  0344  1721            PUSHL   SP                              ; statistics block. Push address
                                  0346  1722                                                    ; on the stack for a call.
                   01A3'CF    DF  0346  1723            PUSHAL  DIREC_BUFFER                    ; Send address of a buffer for
                                  034A  1724                                                    ; RT-11 directory segments.
                   004C'CF    DF  034A  1725            PUSHAL  FILE_DESCRIP                    ; Send descriptor of file.
              0000'CF    03   FB  034E  1726            CALLS   #3,RTF$OPENFILE                 ; Look up the file.
                      1D 50   E8  0353  1727            BLBS    R0,READ_FILE                    ; Branch on successful lookup.
                                  0356  1728            MSG     <-E-Unable to locate file>
                       FEFA   30  0356                  BSBW    BOO$FACMSG
6F 74 20 65 6C 62 61 6E 55 2D 45  2D  0359                  .ASCIZ  \-E-Unable to locate file\
65 6C 69 66 20 65 74 61 63 6F 6C  20  0365
                              00  0371
                                  0372
                              04  0372  1729            RET                                     ; And return.
                                  0373  1730
                                  0373  1731 ;
                                  0373  1732 ; Now read the file into memory, a block at a time. Store the number of
                                  0373  1733 ; blocks left to read in R3. The statistics block filled by RTF$OPENFILE
                                  0373  1734 ; contains the following:
                                  0373  1735 ;
                                  0373  1736 ;          +---------------------------+
                                  0373  1737 ;          ¦   starting LBN of file    ¦
                                  0373  1738 ;          +---------------------------+
                                  0373  1739 ;          ¦ number of blocks in file  ¦
                                  0373  1740 ;          +---------------------------+
                                  0373  1741 ;
                                  0373  1742
                                  0373  1743 READ_FILE:                                         ; Read in the file.
                  53   04 AE  D0  0373  1744            MOVL    4(SP),R3                        ; Get number of blocks in file.
              54   0024'CF    D0  0377  1745            MOVL    GOODMEM_BASE,R4                 ; Get base of good memory.
              54   0048'CF    D1  037C  1746            CMPL    START_ADDRESS,R4                ; Is the start address in good
                         28   1F  0381  1747            BLSSU   20$                             ; memory? Branch if not.
                   0048'CF    D1  0383  1748            CMPL    START_ADDRESS,-                 ; Is the start address below
              0000C000 E4         0387  1749                    BOOT58_OFFSET(R4)               ; the start of BOOT58 code?
```

```
                        14   1E  038C  1750          BGEQU   10$                              ; No. See if it's past BOOT58.
                 55  53  09   78  038E  1751          ASHL    #9,R3,R5                         ; Get number of bytes in file.
                 55  0048'CF  C0  0392  1752          ADDL2   START_ADDRESS,R5                 ; Get final load address + 1.
          0000C000 E4   55   D1  0397  1753          CMPL    R5,BOOT58_OFFSET(R4)             ; Breaking into BOOT58?
                        3C   1B  039E  1754          BLEQU   30$                              ; No. Go load the code.
                        09   11  03A0  1755          BRB     20$                              ; Yes. Report no fit error.
                                 03A2  1756
                                 03A2  1757 10$:                                              ; See if loading past BOOT58.
                   0048'CF   D1  03A2  1758          CMPL    START_ADDRESS,-                  ; Is the start address past
                   0028'CF       03A6  1759                  FIRST_FREE_BYTE                  ; BOOT58's memory usage?
                        31   1E  03A9  1760          BGEQU   30$                              ; Yes. Branch to load code.
                                 03AB  1761
                                 03AB  1762 20$:                                              ; Invalid start address.
                                 03AB  1763          MSG     <-E-Memory in use, choose a different address>
                      FEA5   30  03AB                BSBW    BOO$FACMSG
6E 69 20 79 72 6F 6D 65 4D 2D 45 2D  03AE                .ASCIZ  \-E-Memory in use, choose a different address\
65 73 6F 6F 68 63 20 2C 65 73 75 20  03BA
74 6E 65 72 65 66 66 69 64 20 61 20  03C6
         00 73 73 65 72 64 64 61 20  03D2
                                 03DB
                             04  03DB  1764          RET                                      ; And return.
                                 03DC  1765
                                 03DC  1766 30$:                                              ; Load the program.
                   0048'CF   DD  03DC  1767          PUSHL   START_ADDRESS                    ; Address to receive file.
                     04 AE   DD  03E0  1768          PUSHL   4(SP)                            ; LBN to read.
                        02   DD  03E3  1769          PUSHL   #2                               ; Number of arguments.
                                 03E5  1770
                                 03E5  1771 READ_BLOCK:                                       ; Read one block.
              0000'CF   6E   FA  03E5  1772          CALLG   (SP),FIL$READ_LBN                ; Read one block.
                     18 50   E8  03EA  1773          BLBS    R0,NEXT_BLOCK                    ; Branch on successful read.
                                 03ED  1774          MSG     <-E-Cannot read file>
                      FE63   30  03ED                BSBW    BOO$FACMSG
65 72 20 74 6F 6E 6E 61 43 2D 45 2D  03F0                .ASCIZ  \-E-Cannot read file\
         00 65 6C 69 66 20 64 61  03FC
                                 0404
                             04  0404  1775          RET                                      ; Return with error status.
                                 0405  1776
                                 0405  1777 NEXT_BLOCK:                                       ; Is there another block to go?
                     01 53   F5  0405  1778          SOBGTR  R3,10$                           ; Branch forward if more blocks.
                             04  0408  1779          RET                                      ; Otherwise, return with status.
                                 0409  1780
                                 0409  1781 10$:
                     04 AE   D6  0409  1782          INCL    4(SP)                            ; Increment LBN to read by 1.
          08 AE   00000200 8F   C0  040C  1783          ADDL    #^X200,8(SP)                     ; Increase memory address by one
                                 0414  1784                                                   ; page.
                        CF   11  0414  1785          BRB     READ_BLOCK                       ; Read another block.
                      0416          .SBTTL  SET_STARTADDR - Sets a START address
                      0416
                      0416  ;++
                      0416  ; SET_STARTADDR
                      0416  ;
                      0416  ; Functional description:
                      0416  ;
                      0416  ;       Loads the start address specified in a LOAD or START command
                      0416  ;       into own storage.
                      0416  ;
                      0416  ; Inputs:
                      0416  ;
                      0416  ;       AP points to the TPARSE parameter block, containing:
                      0416  ;
                      0416  ;       TPA$L_NUMBER    - the starting address
                      0416  ;
                      0416  ; Outputs:
                      0416  ;
                      0416  ;       R1-R11 are preserved.
                      0416  ;
                      0416  ; Implicit outputs:
                      0416  ;
                      0416  ;       START_ADDRESS   - the start address value
                      0416  ;
                      0416  ;--
                      0416
                0FFC  0416          .ENTRY  SET_STARTADDR,-
                      0418                  ^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                      0418
        1C AC     D0  0418          MOVL    TPA$L_NUMBER(AP),-      ; Move the specified address
     0048'CF          041B                  START_ADDRESS           ; into own storage.
     50    01     3C  041E          MOVZWL  #SS$_NORMAL,R0          ; Return success status code.
                  04  0421          RET
```

```
                        0422  1821          .SBTTL  START_PROGRAM - Start at start address
                        0422  1822
                        0422  1823  ;++
                        0422  1824  ; Functional description:
                        0422  1825  ;
                        0422  1826  ;       Restores saved or user-modified registers from the stack. Then
                        0422  1827  ;       transfers control to the address specified in this START command
                        0422  1828  ;       or in the last LOAD command.
                        0422  1829  ;
                        0422  1830  ; Implicit inputs:
                        0422  1831  ;
                        0422  1832  ;       REGISTER_TABLE  - address of saved R0-SP
                        0422  1833  ;       START_ADDRESS   - holds the start address
                        0422  1834  ;
                        0422  1835  ;--
                        0422  1836
                        0422  1837  START_PROGRAM:
5E   0040'CF       D0   0422  1838          MOVL    REGISTER_TABLE,SP       ; Call the register table the
                        0427  1839                                          ; stack top once again.
     3FFF 8F       BA   0427  1840          POPR    #^M<R0,R1,R2,R3,R4,R5,- ; Restore registers R0-FP.
                        042B  1841                  R6,R7,R8,R9,R10,R11,-
                        042B  1842                  AP,FP>
     5E   8E       D0   042B  1843          MOVL    (SP)+,SP                ; Restore saved stack top.
     0048'DF       17   042E  1844          JMP     @START_ADDRESS          ; Transfer control to start
                        0432  1845                                          ; address.
```

```
                               0432          .SBTTL  SET_BYTE - Set byte display mode
                               0432
                               0432  ;++
                               0432  ; Functional description:
                               0432  ;
                               0432  ;       Sets display and deposit length mode to byte.
                               0432  ;
                               0432  ; Implicit inputs:
                               0432  ;
                               0432  ;       COMMAND_FLAGS   - holds command interpretation flags
                               0432  ;
                               0432  ; Implicit outputs:
                               0432  ;
                               0432  ;       CMD_M_BYTE      - set in COMMAND_FLAGS
                               0432  ;
                               0432  ;--
                               0432
                         0FFC  0432          .ENTRY  SET_BYTE,-
                               0434                  ^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                               0434
                               0434
                           CA  0434          BICL    #<CMD_M_LONG!-          ; Clear longword mode.
                               0435                  CMD_M_WORD>,-           ; Clear word mode.
 002C'CF      00001800 8F      0435                  COMMAND_FLAGS
              00002000 8F  C8  043D          BISL    #CMD_M_BYTE,-           ; Set to word mode.
                   002C'CF     0443                  COMMAND_FLAGS
                   50   01 3C  0446          MOVZWL  #SS$_NORMAL,R0          ; Return success status code.
                           04  0449          RET
```

```
                          044A  1876          .SBTTL  SET_WORD - Set word display mode
                          044A  1877
                          044A  1878  ;++
                          044A  1879  ; Functional description:
                          044A  1880  ;
                          044A  1881  ;       Sets display and deposit length mode to word.
                          044A  1882  ;
                          044A  1883  ; Implicit inputs:
                          044A  1884  ;
                          044A  1885  ;       COMMAND_FLAGS   - holds command interpretation flags
                          044A  1886  ;
                          044A  1887  ; Implicit outputs:
                          044A  1888  ;
                          044A  1889  ;       CMD_M_WORD      - set in COMMAND_FLAGS
                          044A  1890  ;
                          044A  1891  ;--
                          044A  1892
                    0FFC  044A  1893          .ENTRY  SET_WORD,-
                          044C  1894                  ^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                          044C  1895
                          044C  1896
                      CA  044C  1897          BICL    #<CMD_M_LONG!-          ; Clear longword mode.
                          044D  1898                  CMD_M_BYTE>,-           ; Clear byte mode.
  002C'CF  00002800 8F    044D  1899                  COMMAND_FLAGS
           00001000 8F C8 0455  1900          BISL    #CMD_M_WORD,-           ; Set to word mode.
                002C'CF   045B  1901                  COMMAND_FLAGS
                50   01 3C 045E 1902          MOVZWL  #SS$_NORMAL,R0          ; Return success status code.
                        04 0461 1903          RET
```

```
                              0462  1905          .SBTTL  SET_LONG - Set longword display mode
                              0462  1906
                              0462  1907 ;++
                              0462  1908 ; Functional description:
                              0462  1909 ;
                              0462  1910 ;        Cancels word mode for displays and deposits.
                              0462  1911 ;
                              0462  1912 ; Implicit inputs:
                              0462  1913 ;
                              0462  1914 ;        COMMAND_FLAGS   - holds command interpretation flags
                              0462  1915 ;
                              0462  1916 ; Implicit outputs:
                              0462  1917 ;
                              0462  1918 ;        CMD_M_WORD      - cleared in COMMAND_FLAGS
                              0462  1919 ;
                              0462  1920 ;--
                              0462  1921
                        0FFC  0462  1922          .ENTRY  SET_LONG,-
                              0464  1923                  ^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                              0464  1924
                          CA  0464  1925          BICL    #<CMD_M_WORD!-            ; Clear word mode.
                              0465  1926                  CMD_M_BYTE>,-             ; Clear byte mode.
002C'CF    00003000 8F        0465  1927                  COMMAND_FLAGS
           00000800 8F    C8  046D  1928          BISL    #CMD_M_LONG,-             ; Set long mode.
                002C'CF       0473  1929                  COMMAND_FLAGS
                  50    01  3C  0476  1930          MOVZWL  #SS$_NORMAL,R0            ; Return success status code.
                          04  0479  1931          RET
```

```
                                047A          .SBTTL  SET_PHYSICAL - Set physical address mode
                                047A
                                047A    ;++
                                047A    ; Functional description:
                                047A    ;
                                047A    ;       Sets address interpretation mode to physical.
                                047A    ;
                                047A    ; Implicit inputs:
                                047A    ;
                                047A    ;       COMMAND_FLAGS   - holds command interpretation flags
                                047A    ;
                                047A    ; Implicit outputs:
                                047A    ;
                                047A    ;       CMD_M_PHYSICAL  - set in COMMAND_FLAGS
                                047A    ;       CMD_M_GENERAL   - cleared in COMMAND_FLAGS
                                047A    ;       CMD_M_INTERNAL  - cleared in COMMAND_FLAGS
                                047A    ;
                                047A    ;--
                                047A
                          0FFC  047A          .ENTRY  SET_PHYSICAL,-
                                047C                  ^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                                047C
                            CA  047C          BICL    #<CMD_M_GENERAL!-         ; Clear general, internal
                                047D                  CMD_M_INTERNAL>,-         ; address modes.
        002C'CF   00000600 8F   047D                  COMMAND_FLAGS
                  00000100 8F   C8  0485      BISL    #CMD_M_PHYSICAL,-         ; Set physical address mode.
                     002C'CF    048B                  COMMAND_FLAGS
                     50   01    3C  048E      MOVZWL  #SS$_NORMAL,R0            ; Return success status code.
                                04  0491      RET
```

```
                                 0492          .SBTTL  SET_GENERAL - Set general register mode
                                 0492
                                 0492   ;++
                                 0492   ; Functional description:
                                 0492   ;
                                 0492   ;       Sets address interpretation mode to GENERAL.
                                 0492   ;
                                 0492   ; Implicit inputs:
                                 0492   ;
                                 0492   ;       COMMAND_FLAGS   - holds command interpretation flags
                                 0492   ;
                                 0492   ; Implicit outputs:
                                 0492   ;
                                 0492   ;       CMD_M_GENERAL   - set in COMMAND_FLAGS
                                 0492   ;       CMD_M_PHYSICAL  - cleared in COMMAND_FLAGS
                                 0492   ;       CMD_M_INTERNAL  - cleared in COMMAND_FLAGS
                                 0492   ;
                                 0492   ;--
                                 0492
                           0FFC  0492          .ENTRY  SET_GENERAL,-
                                 0494                  ^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                                 0494
                             CA  0494          BICL    #<CMD_M_PHYSICAL!-        ; Clear physical, internal
                                 0495                  CMD_M_INTERNAL>,-         ; address modes.
      002C'CF   00000500 8F      0495                  COMMAND_FLAGS
                00000200 8F  C8  049D          BISL    #CMD_M_GENERAL,-          ; Set GENERAL address mode.
                     002C'CF     04A3                  COMMAND_FLAGS
                     50   01 3C  04A6          MOVZWL  #SS$_NORMAL,R0            ; Return success status code.
                             04  04A9          RET
```

```
                                   04AA  1993          .SBTTL  SET_INTERNAL - Set internal processor register mode
                                   04AA  1994
                                   04AA  1995 ;++
                                   04AA  1996 ; Functional description:
                                   04AA  1997 ;
                                   04AA  1998 ;        Sets address interpretation mode to INTERNAL.
                                   04AA  1999 ;
                                   04AA  2000 ; Implicit inputs:
                                   04AA  2001 ;
                                   04AA  2002 ;        COMMAND_FLAGS   - holds command interpretation flags
                                   04AA  2003 ;
                                   04AA  2004 ; Implicit outputs:
                                   04AA  2005 ;
                                   04AA  2006 ;        CMD_M_INTERNAL  - set in COMMAND_FLAGS
                                   04AA  2007 ;        CMD_M_PHYSICAL  - cleared in COMMAND_FLAGS
                                   04AA  2008 ;        CMD_M_GENERAL   - cleared in COMMAND_FLAGS
                                   04AA  2009 ;
                                   04AA  2010 ;--
                                   04AA  2011
                             0FFC  04AA  2012          .ENTRY  SET_INTERNAL,-
                                   04AC  2013                  ^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                                   04AC  2014
                               CA  04AC  2015          BICL    #<CMD_M_PHYSICAL!-      ; Clear physical, general
                                   04AD  2016                  CMD_M_GENERAL>,-        ; address modes.
     002C'CF     00000300 8F       04AD  2017                  COMMAND_FLAGS
                 00000400 8F   C8  04B5  2018          BISL    #CMD_M_INTERNAL,-       ; Set INTERNAL address mode.
                      002C'CF      04BB  2019                  COMMAND_FLAGS
                       50   01 3C  04BE  2020          MOVZWL  #SS$_NORMAL,R0          ; Return success status code.
                               04  04C1  2021          RET
                                   04C2  2022
```

```
                          04C2  2024          .SBTTL  EXADEP_ADDR - Pick up address argument
                          04C2  2025
                          04C2  2026  ;++
                          04C2  2027  ; Functional description:
                          04C2  2028  ;
                          04C2  2029  ;       Stores the address argument of an EXAMINE or DEPOSIT command
                          04C2  2030  ;       in own storage.
                          04C2  2031  ;
                          04C2  2032  ; Inputs:
                          04C2  2033  ;
                          04C2  2034  ;       AP points to the TPARSE parameter block, containing:
                          04C2  2035  ;
                          04C2  2036  ;       TPA$L_NUMBER    - the numeric address specified
                          04C2  2037  ;
                          04C2  2038  ; Implicit inputs:
                          04C2  2039  ;
                          04C2  2040  ;       COMMAND_FLAGS   - tells whether the value in CURRENT_ADDRESS
                          04C2  2041  ;                         is to be interpreted as:
                          04C2  2042  ;
                          04C2  2043  ;                         CMD_M_PHYSICAL - a physical address
                          04C2  2044  ;                         CMD_M_GENERAL  - a general register number
                          04C2  2045  ;                         CMD_M_INTERNAL - an internal processor
                          04C2  2046  ;                                          register number
                          04C2  2047  ;
                          04C2  2048  ; Outputs:
                          04C2  2049  ;
                          04C2  2050  ;       R1-R11 are preserved.
                          04C2  2051  ;
                          04C2  2052  ; Implicit outputs:
                          04C2  2053  ;
                          04C2  2054  ;       CURRENT_ADDRESS - holds address value
                          04C2  2055  ;
                          04C2  2056  ;--
                          04C2  2057
                    0FFC  04C2  2058          .ENTRY  EXADEP_ADDR,-
                          04C4  2059                  ^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                          04C4  2060
        50   1C AC    D0  04C4  2061          MOVL    TPA$L_NUMBER(AP),R0     ; Get numeric argument.
                08    E0  04C8  2062          BBS     #CMD_V_PHYSICAL,-       ; If physical address, no
           002C'CF        04CA  2063                  COMMAND_FLAGS,-         ; modifications necessary.
                22        04CD  2064                  SAVE_ADDRESS
                0A    E0  04CE  2065          BBS     #CMD_V_INTERNAL,-       ; If internal processor
           002C'CF        04D0  2066                  COMMAND_FLAGS,-         ; register, go interpret it.
                13        04D3  2067                  PROC_REGISTER
                          04D4  2068
                          04D4  2069  ;
                          04D4  2070  ; This is a general register number. If a valid specification, change
                          04D4  2071  ; the address to an address in the general register table.
                          04D4  2072  ;
                          04D4  2073
                50    D5  04D4  2074          TSTL    R0                      ; Register must be positive.
                21    19  04D6  2075          BLSS    BAD_REGISTER            ; Otherwise report error.
           0F   50    D1  04D8  2076          CMPL    R0,#SAVED_PC            ; Must also be between R0-PC.
                1C    14  04DB  2077          BGTR    BAD_REGISTER            ; If not, report error.
  0030'CF  0040'DF40  DE  04DD  2078          MOVAL   @REGISTER_TABLE[R0],-   ; Store address of register
                          04E5  2079                  CURRENT_ADDRESS         ; storage location.
                0E    11  04E5  2080          BRB     ADDRESS_SAVED           ; Return.
```

```
                              04E7  2081
                              04E7  2082 ;
                              04E7  2083 ; This is an internal processor register. If a valid specification,
                              04E7  2084 ; get the processor register's value and store it in own storage.
                              04E7  2085 ; Save the own storage address in CURRENT_ADDRESS.
                              04E7  2086 ;
                              04E7  2087
                              04E7  2088 PROC_REGISTER:                                        ; Read a processor register.
                    50    D5  04E7  2089         TSTL    R0                            ; Register must be positive.
                    0E    19  04E9  2090         BLSS    BAD_REGISTER                  ; Otherwise report error.
              3F    50    D1  04EB  2091         CMPL    R0,#^X3F                      ; Must also be within a certain
                    09    14  04EE  2092         BGTR    BAD_REGISTER                  ; range. Branch if not.
                              04F0  2093
                              04F0  2094 ;
                              04F0  2095 ; Address is in R0. Save it.
                              04F0  2096 ;
                              04F0  2097
                              04F0  2098 SAVE_ADDRESS:                                         ; Store physical address.
         0030'CF    50    D0  04F0  2099         MOVL    R0,CURRENT_ADDRESS            ; Store address in own storage.
                              04F5  2100
                              04F5  2101 ADDRESS_SAVED:                                        ; Return.
              50    01    3C  04F5  2102         MOVZWL  #SS$_NORMAL,R0                ; Return success status code.
                          04  04F8  2103         RET
                              04F9  2104
                              04F9  2105 ;
                              04F9  2106 ; Bad address specification.
                              04F9  2107 ;
                              04F9  2108
                              04F9  2109 BAD_REGISTER:
                              04F9  2110         MSG     <-E-No such register>
                  FD57    30  04F9          BSBW    BOO$FACMSG
72 20 68 63 75 73 20 6F 4E 2D 45 2D  04FC          .ASCIZ  \-E-No such register\
         00 72 65 74 73 69 67 65  0508
                              0510
                    50    D4  0510  2111         CLRL    R0                            ; Return error status
                          04  0512  2112         RET
```

```
                         0513            .SBTTL  USE_LAST_ADDR - Repeat same address argument
                         0513
                         0513      ;++
                         0513      ; Functional description:
                         0513      ;
                         0513      ;        Stores the last address used in a previous EXAMINE or DEPOSIT
                         0513      ;        command in the address field of the current command.
                         0513      ;
                         0513      ; Inputs:
                         0513      ;
                         0513      ;        AP points to the TPARSE parameter block.
                         0513      ;
                         0513      ; Implicit inputs:
                         0513      ;
                         0513      ;        LAST_ADDRESS    - the address field of the last EXAMINE or
                         0513      ;                          DEPOSIT command.
                         0513      ;
                         0513      ; Outputs:
                         0513      ;
                         0513      ;        R1-R11 are preserved.
                         0513      ;
                         0513      ; Implicit outputs:
                         0513      ;
                         0513      ;        The TPA$L_NUMBER field of the TPARSE parameter block holds the
                         0513      ;        address value to be used.
                         0513      ;
                         0513      ;--
                         0513
                   0FFC  0513            .ENTRY  USE_LAST_ADDR,-
                         0515                    ^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                         0515
             09      E1  0515            BBC     #CMD_V_GENERAL,-           ; Branch if not general register
   0A 002C'CF            0517                    COMMAND_FLAGS,10$          ;
  52   0040'CF       DE  051B            MOVAL   REGISTER_TABLE,R2          ; Get base addr of register table
  0034'CF    52      C2  0520            SUBL    R2,LAST_ADDRESS            ; Sub. base to give reg #
       0034'CF       D0  0525      10$:  MOVL    LAST_ADDRESS,-             ; Move the last address used
          1C AC          0529                    TPA$L_NUMBER(AP)           ; into the parameter block.
       50    01      3C  052B            MOVZWL  #SS$_NORMAL,R0             ; Return success status code.
                     04  052E            RET
```

```
                          052F  2154            .SBTTL  USE_NEXT_ADDR - Increment address argument
                          052F  2155
                          052F  2156    ;++
                          052F  2157    ; Functional description:
                          052F  2158    ;
                          052F  2159    ;       For physical address mode, adds the current size mode (byte, word
                          052F  2160    ;       or longword, i.e., 1, 2 or 4) to the last address examined or
                          052F  2161    ;       deposited. For registers, adds 1 to the register number stored
                          052F  2162    ;       in LAST_ADDRESS.
                          052F  2163    ;
                          052F  2164    ;
                          052F  2165    ; Inputs:
                          052F  2166    ;
                          052F  2167    ;       AP points to the TPARSE parameter block.
                          052F  2168    ;
                          052F  2169    ; Implicit inputs:
                          052F  2170    ;
                          052F  2171    ;       LAST_ADDRESS     - argument of last EXAMINE or DEPOSIT command
                          052F  2172    ;       CMD_M_WORD       - if set in COMMAND_FLAGS, indicates that the
                          052F  2173    ;                          current length mode is WORD
                          052F  2174    ;
                          052F  2175    ; Outputs:
                          052F  2176    ;
                          052F  2177    ;        R1-R11 are preserved.
                          052F  2178    ;
                          052F  2179    ; Implicit outputs:
                          052F  2180    ;
                          052F  2181    ;       TPA$L_NUMBER field of the TPARSE parameter block holds the
                          052F  2182    ;       computed address.
                          052F  2183    ;
                          052F  2184    ;--
                          052F  2185
                    0FFC  052F  2186            .ENTRY  USE_NEXT_ADDR,-
                          0531  2187                    ^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                          0531  2188
  51     0034'CF    D0    0531  2189            MOVL    LAST_ADDRESS,R1             ; Get last address used.
              08    E1    0536  2190            BBC     #CMD_V_PHYSICAL,-           ; If a register, go check
         002C'CF          0538  2191                    COMMAND_FLAGS,-             ; for boundary conditions.
              17          053B  2192                    CHECK_REG_MAX
  51          04    C0    053C  2193            ADDL    #4,R1                       ; Assume longword mode.
              0B    E0    053F  2194            BBS     #CMD_V_LONG,-               ; If longword mode is set,
         002C'CF          0541  2195                    COMMAND_FLAGS,-             ; just branch out to store the
              22          0544  2196                    SAVE_NEW_ADDR               ; new address in the block.
  51          02    C2    0545  2197            SUBL    #2,R1                       ; Adjust to word length.
              0C    E0    0548  2198            BBS     #CMD_V_WORD,-               ; If word mode is set,
         002C'CF          054A  2199                    COMMAND_FLAGS,-             ; just branch out to store the
              19          054D  2200                    SAVE_NEW_ADDR               ; new address in the block.
  51          01    C2    054E  2201            SUBL    #1,R1                       ; Adjust to byte mode.
              14    11    0551  2202            BRB     SAVE_NEW_ADDR               ; And go store it.
                          0553  2203
                          0553  2204    CHECK_REG_MAX:                              ; Check for maximum register #.
  51          01    C0    0553  2205            ADDL    #1,R1                       ; Increment register number.
  52          0F    D0    0556  2206            MOVL    #SAVED_PC,R2                ; Assume this is a general reg.
              09    E0    0559  2207            BBS     #CMD_V_GENERAL,-            ; If general register, branch
         002C'CF          055B  2208                    COMMAND_FLAGS,-             ; to compare new value with
              03          055E  2209                    COMPARE_REG_NUM             ; maximum register number.
  52          3F    D0    055F  2210            MOVL    #MAX_PROC_REG,R2            ; Internal register. Get maximum
```

```
                                0562  2211                                              ; value.
                                0562  2212
                                0562  2213 COMPARE_REG_NUM:                             ; Check for number too large.
                   52    51  D1 0562  2214         CMPL    R1,R2                        ; New number beyond maximum?
                         05  14 0565  2215         BGTR    BAD_ADDRESS                  ; Yes. Report error.
                                0567  2216
                                0567  2217 SAVE_NEW_ADDR:                               ; Store the new address in the
                1C AC    51  D0 0567  2218         MOVL    R1,TPA$L_NUMBER(AP)          ; TPARSE parameter block.
                             04 056B  2219         RET                                  ; Return to caller.
                                056C  2220
                                056C  2221 BAD_ADDRESS:
                                056C  2222         MSG     <-E-Invalid address specification>
                       FCE4  30 056C               BSBW    BOO$FACMSG
61 20 64 69 6C 61 76 6E 49 2D 45 2D 056F           .ASCIZ  \-E-Invalid address specification\
69 63 65 70 73 20 73 73 65 72 64 64 057B
         00 6E 6F 69 74 61 63 69 66 0587
                                0590
                         50  D4 0590  2223         CLRL    R0                           ; Return error status
                             04 0592  2224         RET
```

```
                          0593  2226          .SBTTL  USE_PREVIOUS    - decrement address arguement
                          0593  2227
                          0593  2228 ;++
                          0593  2229 ; Functional description:
                          0593  2230 ;
                          0593  2231 ;         For PHYSICAL address mode, decrement the LAST_ADDRESS
                          0593  2232 ;         according to the size mode.  If in register mode, decrement
                          0593  2233 ;         the register number by 1.
                          0593  2234 ;
                          0593  2235 ; Inputs:
                          0593  2236 ;
                          0593  2237 ;         AP points to the TPARSE parameter block.
                          0593  2238 ;
                          0593  2239 ; Implicit inputs:
                          0593  2240 ;
                          0593  2241 ;         LAST_ADDRESS    - last address EXAMINEd or DISPLAYed.
                          0593  2242 ;         COMMAND_FLAS    - determines address and size modes.
                          0593  2243 ;
                          0593  2244 ; Outputs:
                          0593  2245 ;
                          0593  2246 ;         None.
                          0593  2247 ;
                          0593  2248 ; Implicit outputs:
                          0593  2249 ;
                          0593  2250 ;         TPA$_NUMBER holds the new address.
                          0593  2251 ;
                          0593  2252 ;--
                          0593  2253
                    0FFC  0593  2254          .ENTRY  USE_PREVIOUS,-
                          0595  2255                  ^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                          0595  2256
51     0034'CF      D0    0595  2257          MOVL    LAST_ADDRESS,R1             ; Get last address used
          51  01    C2    059A  2258          SUBL    #1,R1                       ; Assume register mode
              08    E1    059D  2259          BBC     #CMD_V_PHYSICAL,-           ; Branch if register mode
         002C'CF          059F  2260                  COMMAND_FLAGS,-             ;
              15          05A2  2261                  TEST_MIN_ADDR               ;
          51  03    C2    05A3  2262          SUBL    #3,R1                       ; Assume longword size
              0B    E0    05A6  2263          BBS     #CMD_V_LONG,-               ; Branch if longword size
         002C'CF          05A8  2264                  COMMAND_FLAGS,-             ;
              0C          05AB  2265                  TEST_MIN_ADDR               ;
          51  02    C0    05AC  2266          ADDL    #2,R1                       ; Adjust to word size
              0C    E0    05AF  2267          BBS     #CMD_V_WORD,-               ; Branch if word size
         002C'CF          05B1  2268                  COMMAND_FLAGS,-             ;
              03          05B4  2269                  TEST_MIN_ADDR               ;
          51  01    C0    05B5  2270          ADDL    #1,R1                       ; Adjust to byte size
                          05B8  2271
                          05B8  2272 TEST_MIN_ADDR:
                          05B8  2273 ;
                          05B8  2274 ; The new address in R1 must be greater than zero for all cases.
                          05B8  2275 ;
              51    D5    05B8  2276          TSTL    R1                          ; Is R1 < 0
              08    19    05BA  2277          BLSS    BAD_ADDR                    ; Branch if yes
       1C AC  51    D0    05BC  2278          MOVL    R1,TPA$L_NUMBER(AP)         ; Save new address
          50  01    3C    05C0  2279          MOVZWL  #SS$_NORMAL,R0              ; Return success status
                    04    05C3  2280          RET
                          05C4  2281
                          05C4  2282 BAD_ADDR:
```

```
                                    05C4  2283          MSG     <-E-INVALID ADDRESS SPECIFICATION>
                          FCBC   30 05C4                BSBW    BOO$FACMSG
41 20 44 49 4C 41 56 4E 49 2D 45 2D 05C7                .ASCIZ  \-E-INVALID ADDRESS SPECIFICATION\
49 43 45 50 53 20 53 53 45 52 44 44 05D3
         00 4E 4F 49 54 41 43 49 46 05DF
                                    05E8
                             50  D4 05E8  2284          CLRL    R0                              ; Return error status
                                 04 05EA  2285          RET
                          05EB          .SBTTL  USE_LAST_VALUE - Process "@"
                          05EB
                          05EB  ;++
                          05EB  ; Functional description:
                          05EB  ;
                          05EB  ;       Retrieve the last value displayed or deposited in the last
                          05EB  ;       EXAMINE or DEPOSIT command.  Sets address mode to PHYSICAL.
                          05EB  ;
                          05EB  ; Inputs:
                          05EB  ;
                          05EB  ;       AP points to the TPARSE parameter block.
                          05EB  ;
                          05EB  ; Outputs:
                          05EB  ;
                          05EB  ;       R1-R11 are preserved.
                          05EB  ;
                          05EB  ; Implicit outputs:
                          05EB  ;
                          05EB  ;       TPA$L_NUMBER field of the TPARSE parameter block holds the
                          05EB  ;       last value displayed or deposited.
                          05EB  ;
                          05EB  ;--
                          05EB
                    0FFC  05EB          .ENTRY  USE_LAST_VALUE,-
                          05ED                  ^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                          05ED
        0038'CF     D0    05ED          MOVL    LAST_VALUE,-            ; Put last value displayed in
           1C AC          05F1                  TPA$L_NUMBER(AP)        ; the parameter block.
   FE82 CF    00    FB    05F3          CALLS   #0,SET_PHYSICAL         ; Set address mode physical
        50    01    3C    05F8          MOVZWL  #SS$_NORMAL,R0          ; Return success status code.
                    04    05FB          RET
```

```
                              05FC  2319          .SBTTL  EXAMINE_LOC - Display a location
                              05FC  2320
                              05FC  2321 ;++
                              05FC  2322 ; Functional description:
                              05FC  2323 ;
                              05FC  2324 ;        Displays the contents of a location on the terminal.
                              05FC  2325 ;
                              05FC  2326 ; Implicit inputs:
                              05FC  2327 ;
                              05FC  2328 ;        CURRENT_ADDRESS - the address to be examined
                              05FC  2329 ;        W_FAO_OUT_LEN   - address of a word to receive the length of
                              05FC  2330 ;                          the output string from FAO
                              05FC  2331 ;        LONG_PHY_FORMAT - address of an FAO formatting string that
                              05FC  2332 ;                          displays a hex longword
                              05FC  2333 ;        OUTPUT_FORMAT   - a writable buffer to receive an output format
                              05FC  2334 ;                          built on the fly in this routine.
                              05FC  2335 ;
                              05FC  2336 ; Outputs:
                              05FC  2337 ;
                              05FC  2338 ;        R2-R11 are preserved.
                              05FC  2339 ;
                              05FC  2340 ; Implicit outputs:
                              05FC  2341 ;
                              05FC  2342 ;        LAST_ADDRESS    - receives the address examined; if /G, value
                              05FC  2343 ;                          stored is the register #, not the address
                              05FC  2344 ;                          within the register table.
                              05FC  2345 ;        LAST_VALUE      - receives the value displayed.
                              05FC  2346 ;
                              05FC  2347 ;--
                              05FC  2348
                              05FC  2349 EXAMINE_LOC:
            07F7'CF     9F    05FC  2350          PUSHAB  OUTPUT_FORMAT           ; Push format buffer address
                              0600  2351                                          ; on the stack.
                 11     28    0600  2352          MOVC3   #FORMAT_LENGTH,-        ; Move default format string
            07E6'CF           0602  2353                  LONG_PHY_FORMAT,-       ; into format buffer.
            07F7'CF           0605  2354                  OUTPUT_FORMAT
       50   07F7'CF     9E    0608  2355          MOVAB   OUTPUT_FORMAT,R0        ; Get address of format string.
                 0C     E1    060D  2356          BBC     #CMD_V_WORD,-           ; If not displaying a word,
         08 002C'CF           060F  2357                  COMMAND_FLAGS,5$        ; branch.
0D A0   57583421 8F     D0    0613  2358          MOVL    #^A/!4XW/,13(R0)        ; Replace value field format.
                 0D     E1    061B  2359 5$:      BBC     #CMD_V_BYTE,-           ; If not displaying a byte,
         08 002C'CF           061D  2360                  COMMAND_FLAGS,10$       ; Branch
0D A0   42583421 8F     D0    0621  2361          MOVL    #^A/!4XB/,13(R0)        ; Replace value field format.
                              0629  2362 10$:
                 09     E1    0629  2363          BBC     #CMD_V_GENERAL,-        ; If not general register
         05 002C'CF           062B  2364                  COMMAND_FLAGS,20$       ; mode, branch.
      04 A0   47 8F     90    062F  2365          MOVB    #^A/G/,4(R0)            ; Replace "P" with "G".
                              0634  2366
                              0634  2367 20$:
                 0A     E1    0634  2368          BBC     #CMD_V_INTERNAL,-       ; If not internal processor
         05 002C'CF           0636  2369                  COMMAND_FLAGS,30$       ; register mode, branch.
      04 A0   49 8F     90    063A  2370          MOVB    #^A/I/,4(R0)            ; Replace "P" with "I".
                              063F  2371
                              063F  2372 30$:                                     ; Put descriptors on stack.
            7E   11     9A    063F  2373          MOVZBL  #FORMAT_LENGTH,-(SP)    ; Push format length.
            07BC'CF     9F    0642  2374          PUSHAB  OUTPUT_BUFFER           ; Push buffer address on stack.
            7E   28     9A    0646  2375          MOVZBL  #OUTBUF_LENGTH,-(SP)    ; Push length too.
```

```
             50        5E    D0  0649  2376         MOVL    SP,R0                   ; Save address of descriptors.
                                 064C  2377
                                 064C  2378 ;
                                 064C  2379 ; Push FAO arguments on stack preparatory to a CALL. In the CALL,
                                 064C  2380 ; specify an extra 4 arguments so that the return from the CALL cleans
                                 064C  2381 ; up the descriptors on the stack.
                                 064C  2382 ;
                                 064C  2383
             52   0030'CF    D0  064C  2384         MOVL    CURRENT_ADDRESS,R2      ; Get address to examine.
                        0A    E1  0651  2385         BBC     #CMD_V_INTERNAL,-       ; If not a processor register,
                   002C'CF       0653  2386                 COMMAND_FLAGS,-         ; branch.
                        05       0656  2387                 EXTRACT_VALUE
             53        52    DB  0657  2388         MFPR    R2,R3                   ; Read the processor register.
                        03    11  065A  2389         BRB     PUSH_VALUE              ; And proceed.
                                 065C  2390
                                 065C  2391 ;
                                 065C  2392 ; Just a normal physical address in R2 (either specified by user or
                                 065C  2393 ; derived for a general register).
                                 065C  2394 ;
                                 065C  2395
                                 065C  2396 EXTRACT_VALUE:                          ; Get value to display from
             53        62    D0  065C  2397         MOVL    (R2),R3                 ; the physical address.
                                 065F  2398
                                 065F  2399 PUSH_VALUE:                             ; Put value on stack.
                        53    DD  065F  2400         PUSHL   R3                      ; Display value.
                                 0661  2401
                                 0661  2402 ;
                                 0661  2403 ; For a general register, display the register offset, not the address
                                 0661  2404 ; within the saved register table.
                                 0661  2405 ;
                                 0661  2406
                        09    E1  0661  2407         BBC     #CMD_V_GENERAL,-        ; If not a general register,
                   002C'CF       0663  2408                 COMMAND_FLAGS,-         ; branch.
                        0D       0666  2409                 PUSH_ADDRESS
    54       52   0040'CF    C3  0667  2410         SUBL3   REGISTER_TABLE,R2,R4    ; Compute offset to register.
             54        04    C6  066D  2411         DIVL    #4,R4                   ; Derive register number.
                        54    DD  0670  2412         PUSHL   R4                      ; Put register number on stack.
                        02    11  0672  2413         BRB     FINISH_STACK            ; And proceed.
                                 0674  2414
                                 0674  2415 PUSH_ADDRESS:                           ; Push a plain physical address.
                        52    DD  0674  2416         PUSHL   R2                      ; Display address of value.
                                 0676  2417
                                 0676  2418 FINISH_STACK:                           ; Complete stack setup.
                        80    7F  0676  2419         PUSHAQ  (R0)+                   ; Send output buffer descriptor.
                   07E4'CF    3F  0678  2420         PUSHAW  W_FAO_OUT_LEN           ; Send location for out length.
                        60    7F  067C  2421         PUSHAQ  (R0)                    ; Send format string descriptor.
        0883'CF        09    FB  067E  2422         CALLS   #9,SYS$FAO              ; Format the output string.
                                 0683  2423
                                 0683  2424 ;
                                 0683  2425 ; Write the output string onto the console terminal by calling the
                                 0683  2426 ; read with prompt routine with a null read buffer address. This prints
                                 0683  2427 ; the prompt string and returns.
                                 0683  2428 ;
                                 0683  2429
             50   07E4'CF    3C  0683  2430         MOVZWL  W_FAO_OUT_LEN,R0        ; Get length of output string.
                 07BC'CF40    94  0688  2431         CLRB    OUTPUT_BUFFER[R0]       ; Write a null at end of string.
                        7E    7C  068D  2432         CLRQ    -(SP)                   ; Don't ask for a read.
```

```
       07BC'CF   9F  068F  2433          PUSHAB  OUTPUT_BUFFER               ; Push buffer address on stack.
 0000'CF   03    FB  0693  2434          CALLS   #3,BOO$READPROMPT           ; Output string.
                     0698  2435
                     0698  2436 ;
                     0698  2437 ; Store current address in LAST_ADDRESS so that NEXT and LAST work
                     0698  2438 ; properly. For /G, only store the register number as LAST_ADDRESS.
                     0698  2439 ; Also store the value displayed. Register setup now is as follows:
                     0698  2440 ;
                     0698  2441 ;        R2      - current address
                     0698  2442 ;        R3      - value displayed
                     0698  2443 ;        R4      - general register number (if any)
                     0698  2444 ;
                     0698  2445
            09   E1  0698  2446          BBC     #CMD_V_GENERAL,-            ; If not a general register,
       002C'CF       069A  2447                  COMMAND_FLAGS,-             ; just store the address as is.
            03       069D  2448                  STORE_ADDRESS
      52    54   D0  069E  2449          MOVL    R4,R2                       ; Get register number.
                     06A1  2450
                     06A1  2451 STORE_ADDRESS:
 0034'CF    52   D0  06A1  2452          MOVL    R2,LAST_ADDRESS             ; Store address away.
 0038'CF    53   D0  06A6  2453          MOVL    R3,LAST_VALUE               ; Save the value displayed.
                 04  06AB  2454          RET                                 ; Return to caller with status
                     06AC  2455                                              ; code from FAO.
```

```
                          06AC  2457           .SBTTL  DEPOSIT_VALUE - Pick up data value
                          06AC  2458
                          06AC  2459 ;++
                          06AC  2460 ; Functional description:
                          06AC  2461 ;
                          06AC  2462 ;         Loads the value to be deposited from a DEPOSIT command into
                          06AC  2463 ;         own storage.
                          06AC  2464 ;
                          06AC  2465 ; Inputs:
                          06AC  2466 ;
                          06AC  2467 ;         AP points to the TPARSE parameter block, containing:
                          06AC  2468 ;
                          06AC  2469 ;         TPA$L_NUMBER     - the value to be deposited.
                          06AC  2470 ;
                          06AC  2471 ; Outputs:
                          06AC  2472 ;
                          06AC  2473 ;         R2-R11 are preserved.
                          06AC  2474 ;
                          06AC  2475 ; Implicit outputs:
                          06AC  2476 ;
                          06AC  2477 ;         HOLD_DEPOSIT     - holds value from DEPOSIT command.
                          06AC  2478 ;
                          06AC  2479 ;--
                          06AC  2480
                    0FFC  06AC  2481           .ENTRY  DEPOSIT_VALUE,-
                          06AE  2482                   ^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                          06AE  2483
    51    1C AC     D0    06AE  2484           MOVL    TPA$L_NUMBER(AP),R1       ; Get value to be deposited.
             0C     E1    06B2  2485           BBC     #CMD_V_WORD,-             ; Branch if not word mode
    03 002C'CF            06B4  2486                   COMMAND_FLAGS,10$         ;
       51    51     3C    06B8  2487           MOVZWL  R1,R1                     ; Save a word.
             0D     E1    06BB  2488 10$:      BBC     #CMD_V_BYTE,-             ; Branch if not byte mode
    03 002C'CF            06BD  2489                   COMMAND_FLAGS,20$         ;
       51    51     9A    06C1  2490           MOVZBL  R1,R1                     ; Save a byte.
  0044'CF    51     D0    06C4  2491 20$:      MOVL    R1,HOLD_DEPOSIT           ; Save the value.
       50    01     3C    06C9  2492           MOVZWL  #SS$_NORMAL,R0            ; Return success status code.
                    04    06CC  2493           RET
```

```
                     06CD  2495            .SBTTL  DEPOSIT_DATA - Store a value in memory
                     06CD  2496
                     06CD  2497 ;++
                     06CD  2498 ; Functional description:
                     06CD  2499 ;
                     06CD  2500 ;          Deposits a longword or a word of data into a specified location.
                     06CD  2501 ;
                     06CD  2502 ; Implicit inputs:
                     06CD  2503 ;
                     06CD  2504 ;          CURRENT_ADDRESS - contains the destination address
                     06CD  2505 ;          HOLD_DEPOSIT    - contains the value to be deposited
                     06CD  2506 ;
                     06CD  2507 ; Outputs:
                     06CD  2508 ;
                     06CD  2509 ;          R1-R11 are preserved.
                     06CD  2510 ;
                     06CD  2511 ; Implicit outputs:
                     06CD  2512 ;
                     06CD  2513 ;          LAST_ADDRESS    - holds destination address
                     06CD  2514 ;          LAST_VALUE      - holds value deposited
                     06CD  2515 ;
                     06CD  2516 ;--
                     06CD  2517
                     06CD  2518 DEPOSIT_DATA:
          0A   E1    06CD  2519            BBC     #CMD_V_INTERNAL,-        ; Branch if not using IPR's
  09 002C'CF         06CF  2520                    COMMAND_FLAGS,10$        ;
     0044'CF   DA    06D3  2521            MTPR    HOLD_DEPOSIT,-           ; Deposit data in IPR
     0030'CF         06D7  2522                    CURRENT_ADDRESS          ;
          07   11    06DA  2523            BRB     20$                      ; Rejoin common code
     0044'CF   D0    06DC  2524 10$:       MOVL    HOLD_DEPOSIT,-           ; Deposit the value into the
     0030'DF         06E0  2525                    @CURRENT_ADDRESS         ; specified address.
     0030'CF   D0    06E3  2526 20$:       MOVL    CURRENT_ADDRESS,-        ; Save destination address.
     0034'CF         06E7  2527                    LAST_ADDRESS
     0044'CF   D0    06EA  2528            MOVL    HOLD_DEPOSIT,-           ; Save value deposited.
     0038'CF         06EE  2529                    LAST_VALUE
     50   01   3C    06F1  2530            MOVZWL  #SS$_NORMAL,R0           ; Return success status code.
               04    06F4  2531            RET
```

```
                                     06F5  2533          .SBTTL  EXECUTE_FILE - Process command file
                                     06F5  2534
                                     06F5  2535 ;++
                                     06F5  2536 ; Functional description:
                                     06F5  2537 ;
                                     06F5  2538 ;        Opens the specified file and reads the first block into a
                                     06F5  2539 ;        buffer. Sets a bit in the command flags longword to indicate
                                     06F5  2540 ;        that an indirect file is being processed. The bit is used to
                                     06F5  2541 ;        prevent indirect command file nesting.
                                     06F5  2542 ;
                                     06F5  2543 ; Implicit inputs:
                                     06F5  2544 ;
                                     06F5  2545 ;        IND_CMDBUFFER    - buffer in which to load a block of the file
                                     06F5  2546 ;        FILE_DESCRIP     - string descriptor of the file
                                     06F5  2547 ;
                                     06F5  2548 ;        CMD_M_INDIRECT   - bit set in COMMAND_FLAGS if commands are
                                     06F5  2549 ;                           already being processed from an indirect
                                     06F5  2550 ;                           command file
                                     06F5  2551 ;
                                     06F5  2552 ; Outputs:
                                     06F5  2553 ;
                                     06F5  2554 ;        CMD_M_INDIRECT   - bit set in COMMAND_FLAGS to prevent command
                                     06F5  2555 ;                           file nesting
                                     06F5  2556 ;        IND_CMDBUF_PTR   - pointer to next byte in indirect command file
                                     06F5  2557 ;                           buffer
                                     06F5  2558 ;        IND_W_NEXT_LBN   - (1 word) next LBN to read from command file
                                     06F5  2559 ;        IND_W_BLKS_LEFT  - (1 word) number of blocks left to read in
                                     06F5  2560 ;                           command file
                                     06F5  2561 ;
                                     06F5  2562 ;--
                                     06F5  2563
                                     06F5  2564 EXECUTE_FILE:
                          07    E1   06F5  2565          BBC     #CMD_V_INDIRECT,-          ; If an indirect file is NOT
                  30 002C'CF         06F7  2566                  COMMAND_FLAGS,10$          ; being processed, proceed ok.
                                     06FB  2567          MSG     <-E-Nested command files are not permitted>
                        FB55    30   06FB                BSBW    BOO$FACMSG
6F 63 20 64 65 74 73 65 4E 2D 45    2D   06FE                .ASCIZ  \-E-Nested command files are not permitted\
20 73 65 6C 69 66 20 64 6E 61 6D    6D   070A
6D 72 65 70 20 74 6F 6E 20 65 72    61   0716
                  00 64 65 74 74    69   0722
                                     0728
                        0077    31   0728  2568          BRW     EXIT_NOW                   ; Return
                                     072B  2569
                                     072B  2570 10$:                                        ; Accept command file.
                          7E    7C   072B  2571          CLRQ    -(SP)                      ; Clear space for a file
                          5E    DD   072D  2572          PUSHL   SP                         ; statistics block. Push address
                                     072F  2573                                             ; on the stack for a call.
                     01A3'CF    DF   072F  2574          PUSHAL  DIREC_BUFFER               ; Send address of a buffer for
                                     0733  2575                                             ; RT-11 directory segments.
                     004C'CF    DF   0733  2576          PUSHAL  FILE_DESCRIP               ; Send descriptor of file.
                 0000'CF   03   FB   0737  2577          CALLS   #3,RTF$OPENFILE            ; Look up the file.
                       1E 50    E8   073C  2578          BLBS    R0,READ_CMD_BLOCK          ; On successful read, branch.
                                     073F  2579          MSG     <-E-Unable to locate file>
                        FB11    30   073F                BSBW    BOO$FACMSG
6F 74 20 65 6C 62 61 6E 55 2D 45    2D   0742                .ASCIZ  \-E-Unable to locate file\
65 6C 69 66 20 65 74 61 63 6F 6C    20   074E
                                00   075A
```

```
                                  075B
                        45   11   075B  2580          BRB     EXIT_NOW                ; Return
                                  075D  2581
                                  075D  2582 ;
                                  075D  2583 ; Now read the first block of the file into memory. Store
                                  075D  2584 ;
                                  075D  2585 ;        the number of blocks left to read,
                                  075D  2586 ;        the next LBN to read,
                                  075D  2587 ;        a pointer to the start of the buffer of command data
                                  075D  2588 ;
                                  075D  2589 ; in own storage for later reference by the routine that extracts
                                  075D  2590 ; command records from the file blocks.
                                  075D  2591 ;
                                  075D  2592
                                  075D  2593 READ_CMD_BLOCK:                         ; Read one block.
              04 AE      01  A3   075D  2594          SUBW3   #1,4(SP),-              ; Store # blocks minus 1.
                    07A7'CF       0761  2595                  IND_W_BLKS_LEFT
         07A9'CF    6E   01  A1   0764  2596          ADDW3   #1,(SP),IND_W_NEXT_LBN  ; Store second LBN in file.
                    05A3'CF  9E   076A  2597          MOVAB   IND_CMDBUFFER,-         ; Save a pointer to the
                    07A3'CF       076E  2598                  IND_CMDBUF_PTR          ; buffer.
                    05A3'CF  DF   0771  2599          PUSHAL  IND_CMDBUFFER           ; Address to receive the block.
                      04 AE  DD   0775  2600          PUSHL   4(SP)                   ; Number of LBN to read.
             0000'CF     02  FB   0778  2601          CALLS   #2,FIL$READ_LBN         ; Read 1 LBN.
                      19 50  E8   077D  2602          BLBS    R0,NORMAL_RETURN        ; Branch on successful read.
                                  0780  2603          MSG     <-E-Cannot read file>
                       FAD0  30   0780                BSBW    BOO$FACMSG
65 72 20 74 6F 6E 6E 61 43 2D 45  2D   0783           .ASCIZ  \-E-Cannot read file\
      00 65 6C 69 66 20 64  61   078F
                                  0797
                                  0797  2604
                        09   11   0797  2605          BRB     EXIT_NOW                ; Return
                                  0799  2606
                                  0799  2607 NORMAL_RETURN:                          ; Block is in the buffer.
             00000080 8F     C8   0799  2608          BISL    #CMD_M_INDIRECT,-       ; Set indirect command file
                    002C'CF       079F  2609                  COMMAND_FLAGS           ; bit in command flag longword.
                                  07A2  2610
                                  07A2  2611 EXIT_NOW:                               ; Return via RET
                             04   07A2  2612          RET
                                  07A3  2613
```

```
                                 07A3  2615          .SBTTL PRINT_HELP - Print an RT-11 HELP file at the console.
                                 07A3  2616
                                 07A3  2617 ;++
                                 07A3  2618 ; Functional description:
                                 07A3  2619 ;
                                 07A3  2620 ;        Locate and open an RT-11 format file on the boot device, and
                                 07A3  2621 ;        print that file at the console.
                                 07A3  2622 ;
                                 07A3  2623 ; Implicit inputs:
                                 07A3  2624 ;
                                 07A3  2625 ;        CMD_M_INDIRECT  - This bit is set if we are in a command file.
                                 07A3  2626 ;        FILE_DESCRIP    - File descripter of file to be printed.
                                 07A3  2627 ;
                                 07A3  2628 ; Outputs:
                                 07A3  2629 ;
                                 07A3  2630 ;        None.
                                 07A3  2631 ;
                                 07A3  2632 ; NOTE:
                                 07A3  2633 ;
                                 07A3  2634 ;        HELP cannot be used from within an indirect command file.
                                 07A3  2635 ;        This is because the number and size of the variables that
                                 07A3  2636 ;        would have to be saved to allow this is prohibitive.
                                 07A3  2637 ;
                                 07A3  2638 ;--
                                 07A3  2639 PRINT_HELP:                                 ; Print a file
                       07    E1  07A3  2640          BBC     #CMD_V_INDIRECT,-           ; Are we in a command file?
               2F 002C'CF        07A5  2641                  COMMAND_FLAGS,10$           ; Branch if not
                                 07A9  2642          MSG     <-E-HELP cannot be used w/i a command file>
                     FAA7    30  07A9            BSBW    BOO$FACMSG
6E 6E 61 63 20 50 4C 45 48 2D 45 2D  07AC            .ASCIZ  \-E-HELP cannot be used w/i a command file\
77 20 64 65 73 75 20 65 62 20 74 6F  07B8
64 6E 61 6D 6D 6F 63 20 61 20 69 2F  07C4
                00 65 6C 69 66 20  07D0
                                 07D6
                       35    11  07D6  2643          BRB     EXIT_PRINT_HELP             ; Exit now
                                 07D8  2644 ;
                                 07D8  2645 ; Set up the help-file file descripter.
                                 07D8  2646 ;
                  005E'CF    7D  07D8  2647 10$:     MOVQ    HELP_FILE_DESCRIP,-         ;
                  004C'CF        07DC  2648                  FILE_DESCRIP                ;
                                 07DF  2649 ;
                                 07DF  2650 ; Call OPEN_FILE to locate and open the file.  This will also read
                                 07DF  2651 ; the first LBN of the file intc memory and set CMD_V_INDIRECT.
                                 07DF  2652 ;
             087E'CF    00   FB  07DF  2653          CALLS   #0,OPEN_FILE                ; Open help file
                                 07E4  2654 ;
                                 07E4  2655 ; Now print the file one record at a time.  When the EOF is detected,
                                 07E4  2656 ; CMD_V_INDIRECT will be cleared.
                                 07E4  2657 ;
                                 07E4  2658 NEXT_RECORD:                                ; Get and print next record.
                       07    E1  07E4  2659          BBC     #CMD_V_INDIRECT,-           ; Branch if EOF
                  002C'CF        07E6  2660                  COMMAND_FLAGS,-             ;
                       23        07E9  2661                  EXIT_PRINT_HELP             ;
                  F9CF CF    16  07EA  2662          JSB     GET_A_RECORD                ; Get a record from the file
                    1C 50    E9  07EE  2663          BLBC    R0,EXIT_PRINT_HELP          ; Branch if error
                                 07F1  2664          ;
                                 07F1  2665          ; Print the record at the console.  A special ASCIZ string is
```

```
                        07F1   2666             ; put on the end of the buffer to cause a CRLF at the end of the
                        07F1   2667             ; record.
                        07F1   2668             ;
54    00DC'CF      9E   07F1   2669             MOVAB   COMMAND_BUFFER+1,R4         ; Get address of fisrt char
50    54     51    C1   07F6   2670             ADDL3   R1,R4,R0                    ; Get address of last char
60    07B8'CF      D0   07FA   2671             MOVL    LINE_TERM,(R0)              ; Put line term past last char
             7E    7C   07FF   2672             CLRQ    -(SP)                       ; Create null descripter
             54    DD   0801   2673             PUSHL   R4                          ; Push address of first char
0000'CF      03    FB   0803   2674             CALLS   #3,BOO$READPROMPT           ; Print the record.
          02 50    E9   0808   2675             BLBC    R0,EXIT_PRINT_HELP          ; Branch if error.
             D7    11   080B   2676             BRB     NEXT_RECORD                 ; Process next record.
                        080D   2677
                        080D   2678     EXIT_PRINT_HELP:
                   04   080D   2679             RET                                 ; Return
```

```
                                     080E                  .SBTTL  BOOT_UP - Boot the system
                                     080E  ;++
                                     080E  ; Functional description:
                                     080E  ;
                                     080E  ;               Boot the system using one of several generalized indirect
                                     080E  ;               command files.  The correct file is determined by the
                                     080E  ;               device specified in the BOOT command.  If no device is
                                     080E  ;               specified, boot using the default boot file, DEFBOO.CMD.
                                     080E  ;
                                     080E  ;               If a boot device was specified, it must be of the form
                                     080E  ;               DDCU:, where DD is the generic device type, C is the controller
                                     080E  ;               designator, and U is the unit number.  The correct boot file
                                     080E  ;               is DDCBOO.CMD and the unit number must be deposited in R3
                                     080E  ;               before executing the boot file.
                                     080E  ;
                                     080E  ;               Note that the BOOT command cannot be used w/i a command file.
                                     080E  ;               This is because the overhead in allowing it is prohibitive.
                                     080E  ;
                                     080E  ; Inputs:
                                     080E  ;
                                     080E  ;               COMMAND_FLAGS   - Various flags of intrest
                                     080E  ;               DEV_DESCRIP     - Descripter of the DDCU: string
                                     080E  ;               UNIT_NUMBER     - Unit number of the boot device
                                     080E  ;               DEFBOO_DESCRIP  - Descripter of the default boot file
                                     080E  ;
                                     080E  ; Outputs:
                                     080E  ;
                                     080E  ;               R0              - Return status
                                     080E  ;
                                     080E  ;--
                                     080E  BOOT_UP:                                        ; Boot the system
                            07   E1  080E                  BBC     #CMD_V_INDIRECT,-       ; Are we in a command file
                    2F 002C'CF       0810                          COMMAND_FLAGS,10$       ; Branch if yes
                                     0814                  MSG     <-E-BOOT cannot be used w/i a command file>
                          FA3C   30  0814                  BSBW    BOO$FACMSG
6E 6E 61 63 20 54 4F 4F 42 2D 45 2D  0817                  .ASCIZ  \-E-BOOT cannot be used w/i a command file\
77 20 64 65 73 75 20 65 62 20 74 6F  0823
64 6E 61 6D 6D 6F 63 20 61 20 69 2F  082F
                  00 65 6C 69 66 20  083B
                                     0841
                            3A   11  0841                  BRB     50$                     ; Exit now
                                     0843  ;
                                     0843  ; Decide whether to use the default command file or a special one.
                                     0843  ;
                            0E   E1  0843  10$:            BBC     #CMD_V_NULLDEV,-        ; Was a boot device specified?
                    09 002C'CF       0845                          COMMAND_FLAGS,20$       ; Branch if not
                       0070'CF   7D  0849                  MOVQ    DEFBOO_DESCRIP,-        ; Set up boot file descripter
                       004C'CF       084D                          FILE_DESCRIP            ;
                            0F   11  0850                  BRB     30$                     ; Open the file
                                     0852  ;
                                     0852  ; Set up the boot file spec for a special boot file.
                                     0852  ; Only the first 3 characters of the device spec are needed.
                                     0852  ;
                            03   28  0852  20$:            MOVC3   #3,-                    ; Length
                       0093'DF       0854                          @DEV_DESCRIP+4,-        ; Source
                       0086'DF       0857                          @BOOTFILE_DESCRIP+4     ; Destination
                       0082'CF   7D  085A                  MOVQ    BOOTFILE_DESCRIP,-      ; Set up input for OPEN_FILE
```

```
        004C'CF          085E                   FILE_DESCRIP                    ;
                         0861   ;
                         0861   ; Locate and open the boot file.
                         0861   ;
   087E'CF    00    FB   0861   30$:    CALLS   #0,OPEN_FILE                    ; Open the file
        14 50       E9   0866           BLBC    R0,50$                          ; Branch if error
                         0869   ;
                         0869   ; If the file was opened successfully and a special boot file
                         0869   ; was requested, put the unit number in R3.
                         0869   ;
             0E     E4   0869           BBSC    #CMD_V_NULLDEV,-                ; Was a special boot file requested?
     0B 002C'CF          086B                   COMMAND_FLAGS,40$               ; Branch if not
        50    03    9A   086F           MOVZBL  #SAVED_R3,R0                    ; Get index of saved R3 w/i table
        0097'CF     D0   0872           MOVL    UNIT_NUMBER,-                   ; Put unit number in saved R3
     0040'DF40           0876                   @REGISTER_TABLE[R0]             ;
        50    01    3C   087A   40$:    MOVZWL  #SS$_NORMAL,R0                  ; Put return status in R0
                    04   087D   50$:    RET                                     ; Return
```

```
                087E  2750
                087E  2751          .SBTTL  OPEN_FILE - Locate and open an Rt-11 file.
                087E  2752  ;++
                087E  2753  ;
                087E  2754  ; This routine codes around a messy procedure interface.
                087E  2755  ; This is only a dummy routine that branches to EXECUTE_FILE
                087E  2756  ; and allows it to return to OPEN_FILE's caller via a RET.
                087E  2757  ;
                087E  2758  ;--
                087E  2759
          0000  087E  2760          .ENTRY  OPEN_FILE,^M<>
  FE72      31  0880  2761          BRW     EXECUTE_FILE
```

```
                  0883          .SBTTL  Stand alone I/O support
                  0883
                  0883   ;++
                  0883   ;
                  0883   ; SYS$FAO       - formats an output string
                  0883   ;
                  0883   ; Functional description:
                  0883   ;
                  0883   ;       Calls the system service directly instead of through a vector.
                  0883   ;
                  0883   ;--
                  0883
            0FFC  0883          .ENTRY  SYS$FAO,-
                  0885                  ^M<R2,R3,R4,R5,R6,R7,R8,R9,R10,R11>
                  0885
    F77A'   31    0885          BRW     EXE$FAO+2                ; Branch past entry mask.
```

```
                                 0888          .SBTTL  XDELTA Definitions and a fault handler
                                 0888
                                 0888  ;
                                 0888  ; Define handlers needed by XDELTA.
                                 0888  ;
                                 0888
                                 0888          .ALIGN  LONG                     ; All handlers longword-aligned.
                                 0888
                       00000001  0888          .IF     NE,SADEBUG               ; If XDELTA is included...
                                 0888
                                 0888  EXE$ACVIOLAT::                           ; Access violation vector.
                                 0888  EXE$BREAK::                              ; BPB vector.
                                 0888  EXE$ROPRAND::                            ; Reserved operand vector.
                                 0888  EXE$TBIT::                               ; Trace trap vector.
                                 0888  EXE$GB_CPUTYPE::                         ; Defines CPU to be an 11/750
                       00000002  0888          .LONG   PR$_SID_TYP750           ;
                                 088C  MMG$PAGEFAULT::                          ; Pagefault exception vector.
                                 088C
                                 088C          .ENDC                            ; End of XDELTA conditional.
                                 088C
                                 088C  ;
                                 088C  ; Fault handler for unexpected exception conditions during BOOT58.
                                 088C  ;
                                 088C
                                 088C  BOOT_FAULT:                              ; Handler for most of SCB.
                                 088C
                       00000001  088C          .IF     NE,SADEBUG               ; If XDELTA included...
                  F7C0 CF    16  088C          JSB     INI$BRK                  ; Call XDELTA
                                 0890          .ENDC                            ; End conditional
                                 0890
                                 0890          MSG     </-F-Unexpected Exception/>
                       F9C0  30  0890          BSBW    BOO$FACMSG
74 63 65 70 78 65 6E 55 2D 46 2D 2F  0893          .ASCIZ  \/-F-Unexpected Exception/\
6E 6F 69 74 70 65 63 78 45 20 64 65  089F
                          00 2F  08AB
                                 08AD
               08 0809'CF    E9  08AD          BLBC    B_ENVIRON_SAFE,10$       ; Branch forward if this is
                                 08B2                                           ; a fatal exception.
            5E    080A'CF    D0  08B2          MOVL    L_OLD_STACKP,SP          ; Restore SP.
                       F7DF  31  08B7          BRW     READ_COMMAND             ; Go try again.
                                 08BA
                                 08BA  10$:                                     ; Fatal exception.
                             00  08BA          HALT                             ; Halt processor.
                                 08BB
                                 08BB  ;
                                 08BB  ; Labels required for XDELTA.
                                 08BB  ;
                                 08BB
                       00000001  08BB          .IF     NE,SADEBUG               ; If XDELTA is included...
                                 08BB
                                 08BB  SYSL$CLRSBIA::
                                 08BB  INI$RDONLY::                             ; Dummy change protection
                                 08BB  INI$WRITABLE::                           ; routines.
                             05  08BB          RSB                              ; Just return.
                                 08BC
                                 08BC  EXE$GL_FLAGS::                           ; Dummy flags longword.
                                 08BC  EXE$GL_SCB::                             ; Dummy SCB address pointer.
```

```
00000000  08BC  2832 EXE$V_SIMULATOR == 0                       ; This is not a simulator.
          08BC  2833
          08BC  2834 PFN$AB_STATE::
          08BC  2835 PFN$AB_TYPE::
          08BC  2836 PFN$AL_BAK::
          08BC  2837 PFN$AL_PTE::
          08BC  2838 PFN$AW_BLINK::
          08BC  2839 PFN$AW_FLINK::
          08BC  2840 PFN$AX_BLINK::
          08BC  2841 PFN$AX_FLINK::
          08BC  2842 PFN$AW_REFCNT::
          08BC  2843 PFN$AW_SWPVBN::
          08BC  2844
          08BC  2845 SYS$IOBASE::
          08BC  2846 SCH$GL_CURPCB::
          08BC  2847 SCH$GL_PCBVEC::
          08BC  2848
          08BC  2849 XDS$GT_WORD_PFN::
          08BC  2850 XDS$INIT::
00000000  08BC  2851         .LONG   0
          08C0  2852
          08C0  2853         .ENDC                              ; End of XDELTA conditional.
          08C0  2854
          08C0  2855 ;
          08C0  2856 ; Dummy routine for SYS$ASCTOID. This routine is called by TPARSE for
          08C0  2857 ; the TPA$_IDENT item, which is not used by BOOT58.
          08C0  2858 ;
          08C0  2859
          08C0  2860 SYS$UNWIND::
          08C0  2861 SYS$ASCTIM::
          08C0  2862 SYS$IDTOASC::
          08C0  2863 SYS$ASCTOID::
          08C0  2864 SYS$FILESCAN::
    0000  08C0  2865         .WORD   0                          ; Null entry mask
 50   D4  08C2  2866         CLRL    R0                         ; Return LBC to indicate failure
      04  08C4  2867         RET
          08C5  2868
          08C5  2869 ;
          08C5  2870 ; Labels required for RMSCONIO.
          08C5  2871 ;
          08C5  2872
00000000  08C5  2873         .IF     NE,TSDEBUG                 ; If DEBUG is being linked...
          08C5  2874
          08C5  2875 BOO$AB_PRMBUF::
          08C5  2876 BOO$A_PRMBLK::
          08C5  2877 BOO$GQ_CMDESC::                            ; String descriptor for READ.
          08C5  2878         .LONG   0,RMS_BUFFER               ; Input buffer for RMS read.
          08C5  2879
          08C5  2880 RMS_BUFFER:                                ; Input buffer for RMS.
          08C5  2881         .BYTE   100
          08C5  2882
          08C5  2883 RMS_BUF_LENGTH  = .-RMS_BUFFER             ; Length of RMS buffer.
          08C5  2884
          08C5  2885         .ENDC
```

```
                    08C5  2887          .SBTTL  Declarations that must appear at the end
                    08C5  2888
                    08C5  2889  ;
                    08C5  2890  ; If XDELTA is linked, align end of BOOT58 on a page boundary.
                    08C5  2891  ;
                    08C5  2892
          00000001  08C5  2893          .IF     NE,SADEBUG
                    08C5  2894          .ALIGN  LONG
                    08C8  2895          .ENDC
                    08C8  2896
                    08C8  2897          .NOSHOW EXPANSIONS
                    08C8  2898
                    08C8  2899          .END    BOOT58                          ; Transfer address.
```

```
$$$CNT              = 00000003            CMD_V_INDIRECT      = 00000007
$$$FLG              = FFFFFFFF            CMD_V_INTERNAL      = 0000000A
$$$KEY              = 00000006            CMD_V_LOADCMD       = 00000000
$$$KFG              = FFFFFFFF            CMD_V_LONG          = 0000000B
$$$MOD              = 00000002            CMD_V_NULLDEV       = 0000000E
$$$TMP              = 0000002C  R   06    CMD_V_PHYSICAL      = 00000008
$$KEYTAB            = 00000000  R   05    CMD_V_STARTCMD      = 00000001
ADDRESS_SAVED         000004F5  R   07    CMD_V_UNATTEND      = 0000000F
ANY_VALUE             000000E6  R   04    CMD_V_WORD          = 0000000C
BAD_ADDR              000005C4  R   07    COMMAND_BUFFER        000000DB  R   02
BAD_ADDRESS           0000056C  R   07    COMMAND_FLAGS         0000002C  R   02
BAD_REGISTER          000004F9  R   07    COMMAND_STRING        000001A3  R   02
BIT...              = 00000010            COMPARE_REG_NUM       00000562  R   07
BOO$FACMSG            00000253  RG  07    CONTROLLER            0000016C  R   04
BOO$MSGOUT            00000263  R   07    CURRENT_ADDRESS       00000030  R   02
BOO$READPROMPT        *********   X 07    DEFBOO_DESCRIP        00000070  R   02
BOOT58                00000057  RG  07    DEFBOO_SPEC           00000066  R   02
BOOT58_OFFSET       = 0000C000            DEPOSITCMD            0000007A  R   04
BOOT58_TABLE          00000000  RG  04    DEPOSIT_DATA          000006CD  R   07
BOOTCMD               00000138  R   04    DEPOSIT_VALUE         000006AC  RG  07
BOOTFILE_DESCRIP      00000082  R   02    DEVICE_TYPE           00000166  R   04
BOOTFILE_SPEC         00000078  R   02    DEVSPEC               00000150  R   04
BOOTHIGH              00000000  R   03    DEV_DESCRIP           0000008F  R   02
BOOT_FAULT            0000088C  R   07    DEV_SPEC              0000008A  R   02
BOOT_UP               0000080E  R   07    DIREC_BUFFER          000001A3  R   02
BYPASS_COMMENT        0000012C  R   07    DRIVER_SUBROUT        0000080E  RG  02
B_ENVIRON_SAFE        00000809  R   02    DSC$A_POINTER       = 00000004
B_ERROR_OUT           00000808  R   02    DSC$W_LENGTH        = 00000000
CAR_RETURN          = 0000000D            END_OF_FILE           0000023A  R   07
CHECK_REG_MAX         00000553  R   07    END_OF_LINE           00000165  R   07
CLEAR_ERRBIT          000001AD  R   07    END_OF_RECORD         00000240  R   07
CMDFILE               00000174  R   04    EXADEP_ADDR           000004C2  RG  07
CMD_BUFFER_SIZE     = 000000C4            EXADEP_QUAL           00000092  R   04
CMD_M_BOOTCMD       = 00000020            EXAMINECMD            0000006A  R   04
CMD_M_BYTE          = 00002000            EXAMINE_LOC           000005FC  R   07
CMD_M_CMDFILCMD     = 00000040            EXE$ACVIOLAT          00000888  RG  07
CMD_M_DEPOSCMD      = 00000008            EXE$BREAK             00000888  RG  07
CMD_M_EXAMCMD       = 00000004            EXE$FAO               *********   X 07
CMD_M_GENERAL       = 00000200            EXE$GB_CPUTYPE        00000888  RG  07
CMD_M_HELPCMD       = 00000010            EXE$GL_FLAGS          000008BC  RG  07
CMD_M_INDIRECT      = 00000080            EXE$GL_SCB            000008BC  RG  07
CMD_M_INTERNAL      = 00000400            EXE$MCHKVEC         = 00000004  RG  03
CMD_M_LOADCMD       = 00000001            EXE$ROPRAND           00000888  RG  07
CMD_M_LONG          = 00000800            EXE$TBIT              00000888  RG  07
CMD_M_NULLDEV       = 00004000            EXE$V_SIMULATOR     = 00000000   G
CMD_M_PHYSICAL      = 00000100            EXECUTE_COMMAND       0000027B  RG  07
CMD_M_STARTCMD      = 00000002            EXECUTE_FILE          000006F5  R   07
CMD_M_UNATTEND      = 00008000            EXIT_GETRECORD        00000252  R   07
CMD_M_WORD          = 00001000            EXIT_NOW              000007A2  R   07
CMD_STRING_SIZE     = 00000400            EXIT_PRINT_HELP       0000080D  R   07
CMD_V_BOOTCMD       = 00000005            EXPLICIT_VALUE        000000F4  R   04
CMD_V_BYTE          = 0000000D            EXTRACT_VALUE         0000065C  R   07
CMD_V_CMDFILCMD     = 00000006            FIL$READ_LBN          *********   X 07
CMD_V_DEPOSCMD      = 00000003            FILESPEC              00000112  R   04
CMD_V_EXAMCMD       = 00000002            FILE_DESCRIP          0000004C  R   02
CMD_V_GENERAL       = 00000009            FILE_SPEC             0000009B  R   02
CMD_V_HELPCMD       = 00000004            FILL_SCB              00000022  R   07
```

```
FINISH_STACK                     00000676 R       07      PFN$AL_PTE                         000008BC RG      07
FIRST_FREE_BYTE                  00000028 R       02      PFN$AW_BLINK                       000008BC RG      07
FORMAT_LENGTH                  = 00000011                 PFN$AW_FLINK                       000008BC RG      07
FORM_FEED                      = 0000000C                 PFN$AW_REFCNT                      000008BC RG      07
GET_A_CHARACTER                  00000119 R       07      PFN$AW_SWPVBN                      000008BC RG      07
GET_A_RECORD                     000001BD R       07      PFN$AX_BLINK                       000008BC RG      07
GET_CHAR                         000001CE R       07      PFN$AX_FLINK                       000008BC RG      07
GOODMEM_BASE                     00000024 R       02      PR$_SCBB                         = 00000011
GOT_A_LINE                       0000010B R       07      PR$_SID_TYP750                   = 00000002
HELPCMD                          00000132 R       04      PRINT_HELP                         000007A3 R       07
HELP_FILE_DESCRIP                0000005E R       02      PROC_REGISTER                      000004E7 R       07
HELP_FILE_SPEC                   00000054 R       02      PROMPT_STRING                      000007AE R       02
HOLD_DEPOSIT                     00000044 R       02      PUSH_ADDRESS                       00000674 R       07
HYPHEN_IN_LINE                   00000139 R       07      PUSH_VALUE                         0000065F R       07
IND_CMDBUFFER                    000005A3 R       02      READ_A_LINE                        000000A7 R       07
IND_CMDBUF_PTR                   000007A3 R       02      READ_BLOCK                         000003E5 R       07
IND_W_BLKS_LEFT                  000007A7 R       02      READ_CMD_BLOCK                     0000075D R       07
IND_W_NEXT_LBN                   000007A9 R       02      READ_COMMAND                       00000099 R       07
INI$BRK                          00000050 RG      07      READ_FILE                          00000373 R       07
INI$RDONLY                       000008BB RG      07      REGISTER_TABLE                     00000040 R       02
INI$WRITABLE                     000008BB RG      07      RETURN_RECORD                      0000024F R       07
IN_COMMAND_FILE                  000007AD R       02      RPB$M_MPM                        = 00000800
KEY_TABLE                        00000000 RG      05      RPB$M_NODEFBOO                   = 00000800
LAST_ADDRESS                     00000034 R       02      RPB$V_BOOBPT                     = 00000005
LAST_VALUE                       00000038 R       02      RPB$V_MPM                        = 0000000B
LIB$TPARSE                       ********      X  07      RPB$V_NODEFBOO                   = 0000000B
LINE_FEED                      = 0000000A                 RTF$OPENFILE                       ********      X  07
LINE_TERM                        000007B8 R       02      SADEBUG                          = 00000001
LOADCMD                          0000004A R       04      SAENVIRON                        = 00000001
LOAD_FILE                        00000342 R       07      SAVED_AP                         = 0000000C
LOAD_QUAL                        00000122 R       04      SAVED_FP                         = 0000000D
LOC_QUAL                         0000009E R       04      SAVED_PC                         = 0000000F
LONG_PHY_FORMAT                  000007E6 R       02      SAVED_R0                         = 00000000
LOOK_FOR_BLANK                   00000148 R       07      SAVED_R1                         = 00000001
L_OLD_STACKP                     0000080A R       02      SAVED_R10                        = 0000000A
MAX_PROC_REG                   = 0000003F                 SAVED_R11                        = 0000000B
MMG$PAGEFAULT                    0000088C RG      07      SAVED_R2                         = 00000002
MORE_CHARS                       00000127 R       07      SAVED_R3                         = 00000003
MOV_FILESPEC                     00000302 RG      07      SAVED_R4                         = 00000004
NEXT_BLOCK                       00000405 R       07      SAVED_R5                         = 00000005
NEXT_CHAR                        00000162 R       07      SAVED_R6                         = 00000006
NEXT_COMMAND                     000001B1 R       07      SAVED_R7                         = 00000007
NEXT_RECORD                      000007E4 R       07      SAVED_R8                         = 00000008
NOBRK                            00000051 R       07      SAVED_R9                         = 00000009
NORMAL_RETURN                    00000799 R       07      SAVED_SP                         = 0000000E
NULL                           = 00000000                 SAVED_STATUS                       000007AB R       02
NUMBER                           000000DA R       04      SAVED_VALUE                        0000003C R       02
NUM_OF_CMDS                    = 00000007                 SAVE_ADDRESS                       000004F0 R       07
OPEN_FILE                        0000087E RG      07      SAVE_NEW_ADDR                      00000567 R       07
OUTBUF_LENGTH                  = 00000028                 SAV_DEVSPEC                        00000322 RG      07
OUTPUT_BUFFER                    000007BC R       02      SCH$GL_CURPCB                      000008BC RG      07
OUTPUT_FORMAT                    000007F7 R       02      SCH$GL_PCBVEC                      000008BC RG      07
PARAM_BLOCK                      00000000 R       02      SETUP_BOOT58                       00000000 R       07
PARSE_COMMAND                    0000017C R       07      SET_BOOT_FLAG                      000002E8 RG      07
PFN$AB_STATE                     000008BC RG      07      SET_BYTE                           00000432 RG      07
PFN$AB_TYPE                      000008BC RG      07      SET_CMDFIL_FLAG                    000002F3 RG      07
PFN$AL_BAK                       000008BC RG      07      SET_DEPOS_FLAG                     000002D2 RG      07
```

```
SET_EXAM_FLAG                   000002C7 RG      07      UNIT_NUMBER                     00000097 R       02
SET_GENERAL                     00000492 RG      07      USE_LAST_ADDR                   00000513 RG      07
SET_HELP_FLAG                   000002DD RG      07      USE_LAST_VALUE                  000005EB RG      07
SET_INTERNAL                    000004AA RG      07      USE_NEXT_ADDR                   0000052F RG      07
SET_LOAD_FLAG                   000002B1 RG      07      USE_PREVIOUS                    00000593 RG      07
SET_LONG                        00000462 RG      07      VALID_COMMAND                   0000000E R       04
SET_PHYSICAL                    0000047A RG      07      VERTICAL_TAB                  = 0000000B
SET_STARTADDR                   00000416 RG      07      W_FAO_OUT_LEN                   000007E4 R       02
SET_START_FLAG                  000002BC RG      07      XDELBPT                         ********      X  07
SET_WORD                        0000044A RG      07      XDELIBRK                        ********      X  07
SIZ...                        = 00000001                 XDELTBIT                        ********      X  07
SIZE_QUAL                       000000BC R       04      XDS$GT_WORD_PFN                 000008BC RG      07
SKIP_COMMENT                    0000016F R       07      XDS$INIT                        000008BC RG      07
SS$_NORMAL                    = 00000001
STARTCMD                        0000005E R       04
START_ADDRESS                   00000048 R       02
START_PROGRAM                   00000422 R       07
STORE_ADDRESS                   000006A1 R       07
SYS$ASCTIM                      000008C0 RG      07
SYS$ASCTOID                     000008C0 RG      07
SYS$FAO                         00000883 RG      07
SYS$FILESCAN                    000008C0 RG      07
SYS$IDTOASC                     000008C0 RG      07
SYS$IOBASE                      000008BC RG      07
SYS$UNWIND                      000008C0 RG      07
SYSL$CLRSBIA                    000008BB RG      07
TEST_MIN_ADDR                   000005B8 R       07
TPA$K_COUNT0                  = 00000008
TPA$K_LENGTH0                 = 00000024
TPA$L_COUNT                   = 00000000
TPA$L_NUMBER                  = 0000001C
TPA$L_OPTIONS                 = 00000004
TPA$L_STRINGCNT               = 00000008
TPA$L_STRINGPTR               = 0000000C
TPA$L_TOKENCNT                = 00000010
TPA$L_TOKENPTR                = 00000014
TPA$M_ABBREV                  = 00000002
TPA$_ALPHA                    = 000001EE
TPA$_ANY                      = 000001ED
TPA$_BLANK                    = 000001F2
TPA$_DECIMAL                  = 000001F3
TPA$_DIGIT                    = 000001EF
TPA$_EOS                      = 000001F7
TPA$_EXIT                     = FFFFFFFF
TPA$_FAIL                     = FFFFFFFE
TPA$_FILESPEC                 = 000001EA
TPA$_HEX                      = 000001F5
TPA$_IDENT                    = 000001EC
TPA$_KEYWORD                  = 00000100
TPA$_LAMBDA                   = 000001F6
TPA$_MAXKEY                   = 000000DC
TPA$_OCTAL                    = 000001F4
TPA$_STRING                   = 000001F0
TPA$_SUBXPR                   = 000001F8
TPA$_SYMBOL                   = 000001F1
TPA$_UIC                      = 000001EB
TSDEBUG                       = 00000000
```

```
                                        +----------------+
                                        ! Psect synopsis !
                                        +----------------+

PSECT name                      Allocation          PSECT No.  Attributes
----------                      ----------          ---------  ----------
.  ABS  .                       00000000  (    0.)  00 (  0.)  NOPIC   USR   CON   ABS   LCL NOSHR NOEXE NORD   NOWRT NOVEC BYTE
$ABS$                           00000000  (    0.)  01 (  1.)  NOPIC   USR   CON   ABS   LCL NOSHR   EXE   RD     WRT NOVEC BYTE
BOOT58_DATA                     00000812  ( 2066.)  02 (  2.)  NOPIC   USR   CON   REL   LCL NOSHR   EXE   RD     WRT NOVEC LONG
_Z99BOOT                        00000000  (    0.)  03 (  3.)  NOPIC   USR   CON   REL   LCL NOSHR   EXE   RD     WRT NOVEC PAGE
_LIB$STATE$                     00000180  (  384.)  04 (  4.)    PIC   USR   CON   REL   LCL   SHR   EXE   RD   NOWRT NOVEC BYTE
_LIB$KEY0$                      0000000E  (   14.)  05 (  5.)    PIC   USR   CON   REL   LCL   SHR   EXE   RD   NOWRT NOVEC WORD
_LIB$KEY1$                      00000032  (   50.)  06 (  6.)    PIC   USR   CON   REL   LCL   SHR   EXE   RD   NOWRT NOVEC WORD
$$$$00BOOT                      000008C8  ( 2248.)  07 (  7.)  NOPIC   USR   CON   REL   LCL NOSHR   EXE   RD     WRT NOVEC LONG

                                     +------------------------+
                                     ! Performance indicators !
                                     +------------------------+

Phase                        Page faults    CPU Time       Elapsed Time
-----                        -----------    --------       ------------
Initialization                        29    00:00:00.08    00:00:00.34
Command processing                   109    00:00:00.61    00:00:01.81
Pass 1                               565    00:00:28.73    00:01:00.16
Symbol table sort                      0    00:00:01.55    00:00:02.62
Pass 2                               412    00:00:09.16    00:00:17.06
Symbol table output                    0    00:00:00.23    00:00:00.39
Psect synopsis output                  0    00:00:00.04    00:00:00.04
Cross-reference output                 0    00:00:00.00    00:00:00.00
Assembler run totals                1117    00:00:40.42    00:01:22.43

The working set limit was 2000 pages.
164925 bytes (323 pages) of virtual memory were used to buffer the intermediate code.
There were 60 pages of symbol table space allocated to hold 1015 non-local and 29 local symbols.
2899 source lines were read in Pass 1, producing 111 object records in Pass 2.
34 pages of virtual memory were used to define 28 macros.

                                    +----------------------------+
                                    ! Macro library statistics !
                                    +----------------------------+

Macro library name                            Macros defined
------------------                            --------------
_$255$DUA28:[BOOTS.OBJ]BOOTS.MLB;1                   0
_$255$DUA28:[SYS.OBJ]LIB.MLB;1                       2
_$255$DUA28:[SYSLIB]STARLET.MLB;2                   13
TOTALS (all libraries)                              15

1106 GETS were required to define 15 macros.

There were no errors, warnings or information messages.

MACRO/LIS=LIS$:BOOT58/OBJ=OBJ$:BOOT58 MSRC$:BOOT58/UPDATE=(ENH$:BOOT58)+EXECML$/LIB+LIB$:BOOTS.MLB/LIB
```

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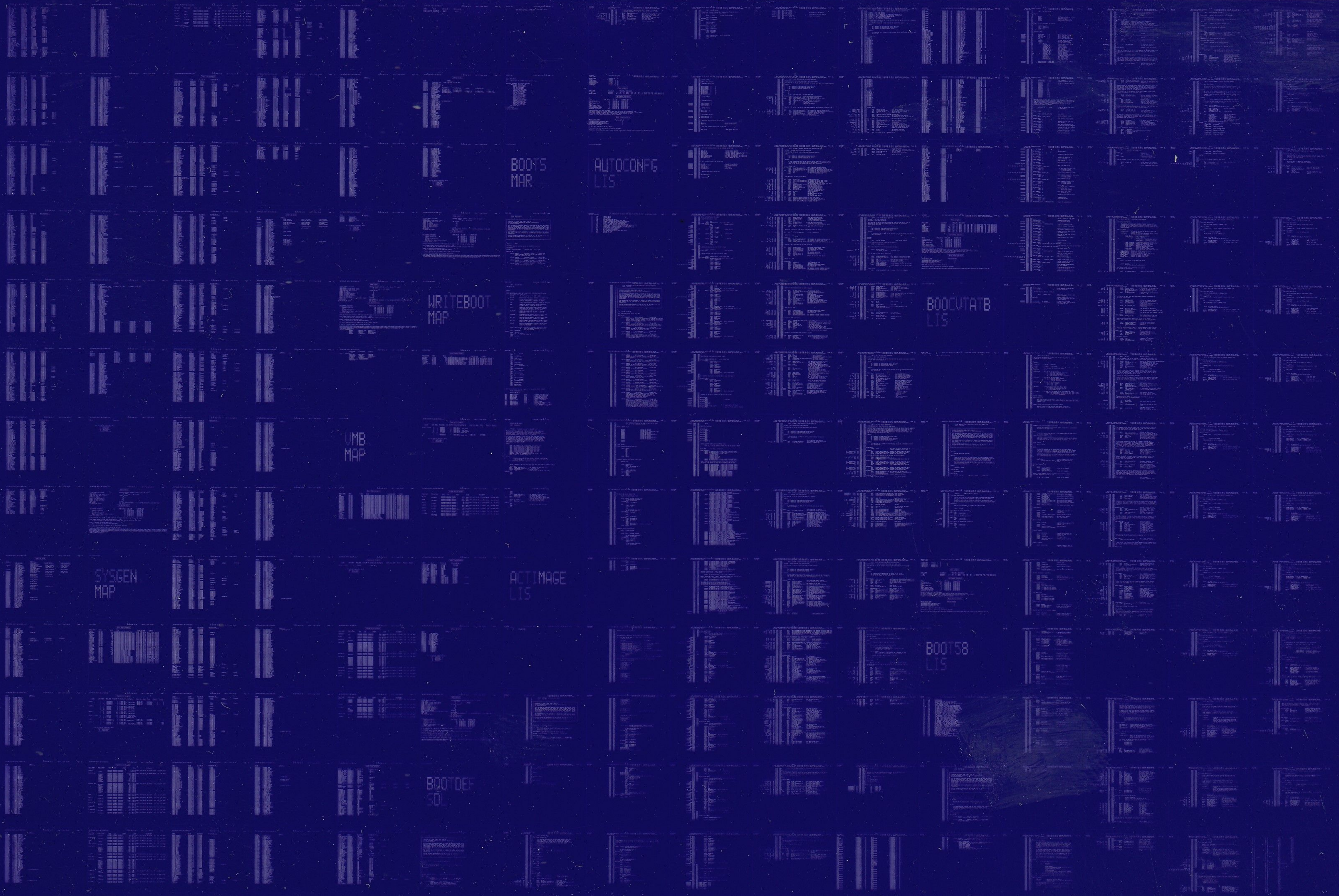

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